

JOHN H. KERR DAM AND RESERVOIR

MASTER PLAN UPDATE

AUGUST 1980

WILMINGTON DISTRICT,
U.S. ARMY CORPS OF ENGINEERS



LEXINGTON, KENTUCKY

CONTRACT NO. DACW54-78-C-0045

MASTER PLAN UPDATE
JOHN H. KERR DAM AND RESERVOIR
ROANOKE RIVER, NORTH CAROLINA AND VIRGINIA

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
	Table of Contents	i
	List of Tables	v
	List of Figures	viii
	List of Photographs	x
	List of Plates	xi
 <u>PART 1 - NATURAL, CULTURAL AND RECREATIONAL RESOURCE INVENTORY</u>		
 CHAPTER 1 - INTRODUCTION		
1-01	Authorization and Purposes	1
1-02	Pertinent Prior Reports	1
1-03	Scope of the Master Plan Update	1
1-04	Master Plan Update Objectives and Format	5
 CHAPTER 2 - NATURAL RESOURCE ANALYSIS		
2-01	Introduction	11
2-02	Project Location	11
2-03	River Basin Description	11
2-04	Physical Geography and Topography	12
2-05	Climate	14
2-06	Geology	14
2-07	Hydrology	24
2-08	Soils	30
2-09	Vegetation	33
2-10	Avifauna	37
2-11	Herpetofauna	38
2-12	Mammals	39
2-13	Wildlife Habitat	40
2-14	Aquatic Resources	44
2-15	Visual Characteristics	45
 CHAPTER 3 - CULTURAL RESOURCE ANALYSIS		
3-01	Introduction	47
3-02	Project Operational Structures	47
3-03	Reservoir Regulation Plan	47
3-04	Kerr Reservoir Market Area	52

TABLE OF CONTENTS (CONT'D.)

<u>Section</u>	<u>Title</u>	<u>Page</u>
3-05	Socio-Economic Profile	52
3-06	Surrounding Land Use	55
3-07	Existing Utilities	55
3-08	Archaeological and Historical Resources	56
3-09	Accessibility	57
3-10	Industrial Use of Project Lands	58
3-11	Application of Public Laws	59
	 CHAPTER 4 - RECREATION USE ANALYSIS	
4-01	Introduction	63
4-02	Summary of Existing Recreation Areas at John H. Kerr	63
4-03	Regional Recreational Resources	67
4-04	Regional Demand for Recreational Facilities	68
4-05	Projected Visitation	71
4-06	Design Loads and Facility Needs	77
4-07	Marina Facility Needs	84
4-08	Comparison of Project and Regional Recreational Needs	84
4-09	Pool Fluctuations and Facility Needs	86
	 CHAPTER 5 - COORDINATION WITH OTHER AGENCIES	
5-01	Policy	89
5-02	Federal Agencies	89
5-03	State of North Carolina	90
5-04	Commonwealth of Virginia	90
5-05	Local Agencies	91
5-06	Private Interest Groups	92
5-07	Leaseholders	92
	 <u>PART 2 - DATA SYNTHESIS, RESOURCE USE OBJECTIVES AND DEVELOPMENT PLAN</u>	
	 CHAPTER 6 - PROJECT WIDE ANALYSIS AND RESOURCE USE OBJECTIVES	
6-01	Introduction	95
6-02	Composite Resource Analysis	95
6-03	Net Usable Recreation Lands	97
6-04	Areas Recommended for Development	98
6-05	Comparison of Capacity of Existing and Proposed Recreation Areas and the Reservoir with Ultimate Visitation Projections	99
6-06	Resource Use Objectives	104

TABLE OF CONTENTS (CONT'D.)

<u>Section</u>	<u>Title</u>	<u>Page</u>
	CHAPTER 7 - FACILITY DEVELOPMENT PLAN	
7-01	Introduction	107
7-02	Land-Use Allocations	107
7-03	Water-Use Allocations	110
7-04	Recreation Facility Distribution	111
7-05	Existing Recreation Areas	114
	Index to Existing Areas	116
7-06	Proposed Recreation Areas	170
	Index to Proposed Areas	171
7-07	Potential Interpretive Features	204
7-08	Inter-Site Trail Development	208
7-09	Resource Manager's Office/Visitor Center	209
7-10	General Development Priorities	209
7-11	Rehabilitation Priorities	214
7-12	Relocation of Existing Facilities	215
	CHAPTER 8 - SITE REHABILITATION DESIGN CRITERIA	
8-01	Introduction	217
8-02	General Facility Design Criteria	217
8-03	Rehabilitation Design Criteria	217
	<u>PART 3 - MANAGEMENT GUIDELINES</u>	
	CHAPTER 9 - RESOURCE MANAGEMENT GUIDELINES	
9-01	Introduction	227
9-02	Project Resource Management Plan	228
9-03	Forest, Fish, and Wildlife Management Plan	229
9-04	Fire Protection Plan	232
9-05	Project Safety Plan	233
9-06	Lakeshore Management Plan	235
	<u>PART 4 - COST ESTIMATES</u>	
	CHAPTER 10 - COST ESTIMATES	
10-01	Summary of Estimated Costs	237
10-02	Facility Costs	237
10-03	Breakdown of Unit Cost Items	238

TABLE OF CONTENTS (CONT'D.)

<u>Section</u>	<u>Title</u>	<u>Page</u>
<u>PART 5 - SPECIAL PROBLEMS</u>		
CHAPTER 11 - SPECIAL PROBLEMS		
11-01	Introduction	277
11-02	Marinas	277
11-03	Erosion and Siltation	278
11-04	Reservoir Fluctuations	280
11-05	Reservoir Access	281
EXHIBIT A - FACILITY DESIGN CRITERIA		
EXHIBIT B - LIST OF AGENCIES AND GROUPS CONTACTED		
EXHIBIT C - SUMMARY OF PROPOSALS FOR CORPS OPERATED AREAS		
Team Members		

LIST OF TABLES

<u>Number</u>	<u>Title</u>	<u>Page</u>
1-01	Pertinent Prior Reports, John H. Kerr Dam and Reservoir	2
1-02	Master Plan Mapping, John H. Kerr Dam and Reservoir	8
2-01	Climatological Summary	15
2-02	Descriptions of Rock Units, John H. Kerr Reservoir	20
2-03	Engineering Properties of Rock Units John H. Kerr Reservoir	23
2-04	Average Values of Water Quality Parameters for Fifteen Tributaries, John H. Kerr Reservoir	25
2-05	Suitability of Existing Wells, John H. Kerr Reservoir	27
2-06	Anticipated Yield of Wells by Geologic Formation; John H. Kerr Reservoir	29
2-07	Suitability and Limitations of Soils Series for Intensive Recreation	31
2-08	Approximate Acreage and Percentage of Project Lands in Nine Vegetation Classifications, John H. Kerr Reservoir	34
2-09	Wildlife Habitat Value of Seven Vegetation Types; John H. Kerr Reservoir	41
3-01	Pool Elevations, Reservoir Area, and Storage Capacity, John H. Kerr Reservoir	48
3-02	Population of the John H. Kerr Reservoir Market Area	54
4-01	Summary of Major Facilities at Existing Recrea- tion Areas, John H. Kerr Dam and Reservoir	64
4-02	Outdoor Recreation Needs in Activity Days, Virginia Region II	70
4-03	Combined Needs: North Carolina SCORP Regions K and L	72
4-04	Per Capita Use Rates for John H. Kerr Dam and Reservoir	74
4-05	Historical and Projected Total Annual Visita- tion to John H. Kerr Dam and Reservoir	74
4-06	1980 Visitation Projection; John H. Kerr Reservoir	76
4-07	Participation Rates, Turnover Rates, and Average Group Size; John H. Kerr Dam and Reservoir	78

LIST OF TABLES (CONT'D.)

<u>Number</u>	<u>Title</u>	<u>Page</u>
4-08	Existing Facilities and Projected Facility Demand, John H. Kerr Dam and Reservoir	82
4-09	Summary of Major Facility Needs, John H. Kerr Dam and Reservoir	83
4-10	Number of Major Recreation Facilities Unusable During 5-Year Frequency Flood (310' m.s.l.), John H. Kerr Dam and Reservoir	86
6-01	Developable Acreage Within Each Existing and Proposed Recreation Area	100
7-01	Summary of Land Use Allocations, John H. Kerr Dam and Reservoir	108
7-02	Total Acres and Tract Numbers for All Existing and Proposed Recreation Areas; John H. Kerr Reservoir	112
7-03	Interpretive Features; John H. Kerr Dam and Reservoir	205
7-04	Development Priorities; John H. Kerr Reservoir	211
7-05	Summary of Facility Relocations	216
10-01	Cost Estimate Summary by Site	242
10-02	Cost Estimate Items, Boat Launch Area	244
10-03	Cost Estimate Items, Class A Camping Area	245
10-04	Cost Estimate Items, Class B Camping Area	246
10-05	Cost Estimate Items, Primitive Camping Area	247
10-06	Cost Estimate Items, Group Camping Area	248
10-07	Cost Estimate Items, Picnic Area	249
10-08	Cost Estimate Items, Beach Areas	250
10-09	Cost Estimate Items, Fishing Area	251
10-10	Cost Estimate Items, Unique Facilities	252
10-11	Summary of Facility Costs for Future Cost Shared Areas and Existing Areas	253
10-12	Rehabilitation Costs of Recreation Facilities at John H. Kerr Reservoir	254
10-13	Summary of Relocated, Rehabilitated, and Converted Facilities at Existing Recreation Areas	255
10-14	Facility Quantities - Future Cost Shared Areas	256
10-15	Cost Estimates North Carolina State Recreation Areas - Kimball Point	257
10-16	Cost Estimates North Carolina State Recreation Areas - County Line Park	259

LIST OF TABLES (CONT'D.)

<u>Number</u>	<u>Title</u>	<u>Page</u>
10-17	Cost Estimates North Carolina State Recreation Areas - Bullocksville Park	261
10-18	Cost Estimates North Carolina State Recreation Areas - Satterwhite Point	263
10-19	Cost Estimates North Carolina State Recreation Areas - Nutbush Creek	265
10-20	Cost Estimates North Carolina State Recreation Areas - Williamsboro Wayside	267
10-21	Cost Estimates North Carolina State Recreation Areas - Townsville Landing	269
10-22	Cost Estimates North Carolina State Recreation Areas - Hibernia Recreation Area	271
10-23	Cost Estimates North Carolina State Recreation Areas - Henderson Point	273
10-24	Cost Estimates; Rehabilitation of Existing Facilities; North Carolina State Recreation Areas	275
10-25	Cost Estimates Virginia State Park Areas	276
10-26	Inter-Site Hiking Trails	276

LIST OF FIGURES

<u>Number</u>	<u>Title</u>	<u>Page</u>
2-01	Roanoke River Basin	13
2-02	Wind Direction and Force, John H. Kerr Reservoir	16
2-03	Sun Diagram, John H. Kerr Reservoir	16
2-04	Average Monthly Temperatures	17
2-05	Average Monthly Precipitation	17
3-01	Reservoir Area and Volumes; John H. Kerr Dam and Reservoir	49
3-02	Reservoir Rule Curve; John H. Kerr Dam and Reservoir	50
3-03	Correlation Between Development Criteria and the Estimated Reservoir Hydrology	53
4-01	Major Recreational Resources of the John H. Kerr Dam and Reservoir Market Area	69
4-02	Projected Visitation to John H. Kerr Dam and Reservoir	75
6-01	Natural and Cultural Resource Composite Matrix	96
7-01	Proposed Development for the Expansion of Bullocksville Park	140
8-01	Camp Site Rehabilitation	219
8-02	Picnic Site Rehabilitation	221
8-03	Rehabilitation of a Project Structure	224

LIST OF PHOTOGRAPHS

<u>Number</u>	<u>Title</u>	<u>Page</u>
4-01	Effects of High Water on Typical Day-Use Area at John H. Kerr Reservoir	87
4-02	Effects of High Water on Typical Recreation Area Access Road	87
8-01	Existing Campsite	219
8-02	Existing Picnic Site	221
8-03	Existing Washhouse	224
8-04	Existing Concrete Block Structure	225
8-05	Typical Rehabilitation of Project Structure	225
8-06	Example of Shoreline Erosion Problem at John H. Kerr Reservoir	226
8-07	Example of Shoreline Protection with Gabions at a Project Similar to John H. Kerr Reservoir	226
11-01	Shoreline Erosion; John H. Kerr Reservoir	279
11-02	Effect of High Water on Recreation Facilities; John H. Kerr Reservoir	280

LIST OF PLATES*

<u>Number</u>	<u>Title</u>
1-01	Index
2-01	Project Location
2-02	Slope Analysis
2-03	Slope Analysis
2-04	Geology
2-05	Geology
2-06	Soil Suitability and Water Quality
2-07	Soil Suitability and Water Quality
2-08	Vegetation
2-09	Vegetation
2-10	Wildlife Habitat Quality
2-11	Wildlife Habitat Quality
2-12	Aquatic Habitat Classification and Evaluation
2-13	Aquatic Habitat Classification and Evaluation
3-01	Existing Land Use
3-02	Existing Land Use
3-03	Real Estate
3-04	Real Estate
3-05	Cultural Influences
3-06	Cultural Influences
3-07	Archaeological Site Probability Density
3-08	Archaeological Site Probability Density
3-09	Jurisdictional Map
3-10	Jurisdictional Map
4-01	Site Location Map
6-01	Natural Resource Composite
6-02	Natural Resource Composite
6-03	Net Usable Recreation Lands
6-04	Net Usable Recreation Lands
7-01	Land-Use Allocation Plan
7-02	Land-Use Allocation Plan
7-03	Water Use
7-04	Water Use
7-05	Recreation Use Patterns
7-06	Recreation Use Patterns
7-Index (1)	Index to Site Plans
7-Index (2)	Index to Site Plans

*All plates have been included in a separate Master Plan Map Portfolio. The initial Plate Number (preceding the dash) refers to the chapter that the plate is referenced in.

LIST OF PLATES (CONT'D.)

<u>Number</u>	<u>Title</u>
<u>SITE PLANS</u>	
7-07	Palmer Point Island Creek Grassy Creek
7-08	Ivy Hill A Staunton View Buffalo Springs Wayside
7-09	Ivy Hill B
7-10	Longwood Tailrace Access Area Buffalo
7-11	Bluestone Landing Rudds Creek Eastland Creek Landing
7-12	North Bend Park and Marina
7-13	Eagle Point Landing North Bend Park and Marina
7-14	Clarksville Overlook Town View Butchers Bayview
7-15	Henderson Point Kimball Point
7-16	County Line Park
7-17	Bullocksville Park
7-18	Flemingtown Road Marina Clarksville Marina
7-19	Satterwhite Point Park
7-20	Nutbush Creek Recreation Area Williamsboro Wayside
7-21	Townsville Landing and Marina
7-22	Hibernia Recreation Area
7-23	Occoneetchee State Park
7-24	Occoneetchee State Park
7-25	Occoneetchee State Park
7-26	Clover Landing Hycos Landing
7-27	Lakeside Camping & Sports Club University of North Carolina North State Boating Club
7-28	North Carolina State University Fort Bragg Cherokee B.S.A. R. E. Lee B.S.A.

LIST OF PLATES (CONT'D.)

<u>Number</u>	<u>Title</u>
7-29	Methodist Board of Education Pines of Carolina G.S.A. North Carolina State University Faculty Presbytery of Granville
7-30	Tuscarora Council B.S.A. Future Lease Site
7-31	State Line Baptist Virginia Tidewater G.S.A. Lynchburg Y.M.C.A.
7-32	Occoneetchee B.S.A.
7-33	South Dike Park
7-34	Keats Peninsula
7-35	Piney Grove Burrough Mill Landing Duck Island Buchanan's Woods
7-36	Nutbush Woods Walnut Hill Oakleaf Point
7-37	Long Grass Point Viking Hills Park
7-38	Berry Hill Shores Moore'sville Woods Boydton Landing
7-39	Beaver Woods Soudan Landing
7-40	Soudan Village
7-41	Garretts Woods Turtle Head Peninsula
7-42	Sunrise Landing Holly Grove
7-43	Staunton River State Park Extension
7-44	Bluestone Park Aaron Access Point Riverdale Access Area
7-45	Newman Point Campers Cove Inglewood
7-46	Interpretive Features
7-47	Interpretive Features
9-01	Operations and Maintenance
9-02	Operations and Maintenance

PART 1
NATURAL, CULTURAL
AND RECREATIONAL
RESOURCE INVENTORY

CHAPTER 1
INTRODUCTION

CHAPTER 1

INTRODUCTION

1-01 AUTHORIZATION AND PURPOSES

The John H. Kerr Dam and Reservoir project was authorized by the Flood Control Act approved 22 December 1944 (Public Law 534, 78th Cong., 2d sess.) as the initial unit of the comprehensive plan for the development of the water resources of the Roanoke River Basin, Virginia and North Carolina. The name of the project was changed from "Buggs Island Reservoir" to "John H. Kerr Dam and Reservoir" by Public Law 203, 82d Congress, approved 24 October 1951. The development of public recreational facilities at power, flood control, and navigation projects is authorized by Section 4 of the Flood Control Act of ~~1946~~, Section 209 of the Flood Control Act of 1954, Section 207 of the Flood Control Act of 1962, and by the Land and Water Conservation Fund Act of 1965, as amended.

¹⁹⁴⁴
The authorized purposes of the John H. Kerr project are flood control and electric power generation. Other associated purposes include the regulation of riverflow for subsequent hydroelectric plants and navigation, as well as the provision of public recreational opportunities.

1-02 PERTINENT PRIOR REPORTS

A number of pertinent studies related to John H. Kerr Reservoir have been completed and are listed in Table 1-01. Each of these studies was considered in the development of this Master Plan Update. In addition to the listed Corps of Engineers studies, numerous reports by local, regional, and state agencies concerning John H. Kerr Reservoir and the region that it serves were consulted. These reports are referenced in appropriate places throughout the Master Plan Update.

1-03 SCOPE OF THE MASTER PLAN UPDATE

A. General. In accordance with ER 1120-2-400 the Master Plan Update (including all associated appendices) describes how all project lands, waters, forests, and other resources will be enhanced, developed, used and managed in the public interest. The Master Plan Update examines those features which contribute to the potential of the project to support recreation development and use. Although the general purposes and content of this planning effort are similar to previous plans, several unique features have been incorporated. These features relate to the scope and format of the planning effort as described below.

TABLE 1-01
PERTINENT PRIOR REPORTS
JOHN H. KERR DAM AND RESERVOIR

REFERENCE	TITLE	SUBMITTED
--	"308" Report, Roanoke River, Virginia and North Carolina	1934
--	Interim Report - Buggs Island Reservoir, Roanoke River Basin, Virginia and North Carolina	30 Dec. 1941
--	Review Report, Roanoke River, Virginia and North Carolina	30 Jan. 1943
--	Roanoke River and Its Tributaries	22 May 1944
--	Definite Project Report, Buggs Island Reservoir, Roanoke River, Virginia and North Carolina	1 Feb. 1946
--	Analysis of Design for Concrete Dam, Earth Dikes, Powerhouse, and Switchyard - Buggs Island Dam, Roanoke River Basin, Virginia and North Carolina	22 Mar. 1948
Supplement No. 1 (to above)	Analysis of Design for Concrete Dam, Earth Dike, Powerhouse, and Switchyard, Buggs Island Project	1 May 1950
--	Analysis of Design - Reservoir Clearing - Buggs Island Project	10 Jun. 1949
--	Reservoir Regulation Manual, John H. Kerr Reservoir	1 Sep. 1952 31 Dec. 1953
--	Master Plan for Reservoir Development, John H. Kerr Dam and Reservoir Roanoke River Basin, Virginia - North Carolina	24 Nov. 1952
--	Operation and Maintenance Manual, John H. Kerr Project	1957

TABLE 1-01 (CONT'D.)

REFERENCE	TITLE	SUBMITTED
Design Memorandum No. 1B(C1)	John H. Kerr Reservoir, Roanoke River, Virginia - North Carolina, Public Use and Access Facilities (PWAA - FY 63)	3 Dec. 1962
Design Memorandum No. 1B(C2)	John H. Kerr Reservoir, Roanoke River, Virginia - North Carolina Public Use and Access Facilities	7 Oct. 1963
Supplement 1B to D.M. 1B	John H. Kerr Forest Management Plan	1965
Design Memorandum No. 1B	The Master Plan for John H. Kerr Dam and Reservoir, Roanoke River Basin, Virginia - North Carolina	15 Feb. 1965
Design Memorandum No. 1B, Supple- ment No. 1	Forest Fire Control Plan, Part of the Master Plan for John H. Kerr Dam and Reservoir, Roanoke River Basin, Virginia and North Carolina	24 Sep. 1965
--	Roanoke River Basin Reservoir Regulation Manual	Oct. 1965
--	Real Estate Land Use Plan, Supple- ment to Master Plan, John H. Kerr Reservoir, Virginia and North Carolina	26 Jan. 1966
Design Memorandum No. 1B(C3)	John H. Kerr Reservoir, Roanoke River, Virginia - North Carolina Public Use and Access Facilities Part 1 (Old Areas)	11 May 1966
Design Memorandum No. 2	John H. Kerr Dam and Reservoir Roanoke River, Virginia - North Carolina, Necessity and Plan for Relocation of Virginia Secondary Roads 678 and 835 at North Bend Park Public Use Area	20 Apr. 1966

TABLE 1-01 (CONT'D.)

REFERENCE	TITLE	SUBMITTED
Design Memorandum No. 3	John H. Kerr Dam and Reservoir Roanoke River, Virginia - North Carolina, Resource Manager's Office and Visitor Center	1975
Appendix D	Fish and Wildlife Management Plan	Sept. 1976
Appendix E	Project Resource Management Plan	1976
Appendix F	Interim Lakeshore Management Plan	Mar. 1977
--	John H. Kerr Reservoir Limnological Study	May 1978
Design Memorandum No. 4	Recreation Facilities John H. Kerr Reservoir	1979
Design Memorandum No. 5	Master Plan Update	1980
Appendix G	Environmental Inventory and Analysis	1980
Appendix H	Archaeological and Historical Survey	1980
Appendix F	Lakeshore Management Plan	Aug. 1980

B. Scope. The Master Plan Update provides a comprehensive inventory and analysis of pertinent base data, and develops a framework upon which future management and development policies and actions can be based. The Master Plan Update places particular importance on the identification and analysis of environmental characteristics in accordance with SADvR 1110-2-10 which states "Environmental protection and enhancement will receive ultimate consideration in all planning, design, construction, and management." The plan is supported by detailed supplemental studies (developed concurrently with this

document) of vegetation and terrestrial and aquatic biology¹; and archaeology².

To make optimum use of the resource base data collected for the Master Plan Update, graphic analyses have generally been completed at two mapping scales. The format and intent of the graphic analysis is explained in detail in Section 1-04 (D) below.

1-04 MASTER PLAN UPDATE OBJECTIVES AND FORMAT

A. General. Based upon the scope as described in the previous section a number of specific objectives were developed to guide the preparation of the plan. Sections of the Master Plan Update text that directly correspond to certain objectives have been noted so that the reader can more easily identify how each objective was accomplished.

B. Master Plan Update Objectives.

1. To present an integrated plan for recreation and other project purposes that has the ability to move through design, construction, and into operation with little change in purpose, appearance, or utility.

2. To explain the planning process applied throughout the master plan so that minimum effort is required to understand and follow-up on the methodology applied herein.

3. To prepare a data base which identifies the major characteristics of the natural and cultural resources within the project area, and to utilize this data base as a tool in preparing appropriate development plans and management recommendations. (Chapters 2-3, 6 and 7; and Appendices G and H)

4. To identify future recreational demand for each major recreational activity to assist in planning recreational areas and in prioritizing all future development. (Chapter 4 and 7-09)

5. To actively coordinate the master planning process with the public and interested local, state, and federal agencies. (Chapter 5)

¹Environmental Inventory and Analysis, John H. Kerr Reservoir, U.S. Army, Corps of Engineers, Wilmington District, 1980.

²Archaeological and Historical Investigations, John H. Kerr Reservoir, U.S. Army, Corps of Engineers, Wilmington District, 1980.

6. To conduct an analysis which summarizes all major environmental factors considered during the preparation of the Master Plan Update in terms of their combined effect on the suitability of land areas for land use allocations such as recreation, wildlife management, and forest management. (Chapter 6, Section 6-02)

7. To identify lands which are suitable for intensive recreational development based upon specific criteria. (Chapter 6, Section 6-03)

8. To prepare a plan which will promote the continued public utilization of all project resources up to a capacity which is consistent with Corps of Engineers policies, development and management constraints, and the natural and cultural environment. (Chapter 6, Section 6-05)

9. To develop resource use objectives which specify the attainable, publicly acceptable options for resource use based upon an analysis of resource capabilities and public needs. (Chapter 6, Section 6-06)

10. To address any potential conflicts between public use of the project and requested private use of public lands by adjacent landowners or developers. (Chapter 7, Section 7-02 and Appendix F)

11. To provide a total plan of development including a land and water use plan, conceptual recreation area plans illustrating all existing and proposed facilities, and supporting development such as a project-wide trails plan and a general interpretive plan. (Chapter 7)

12. To propose future recreation area plans that will provide for more efficient management and operation through the consolidation of certain existing areas, and the separation of day use and overnight facilities. (Chapter 7, Section 7-05, 06)

13. To develop design criteria to be used to rehabilitate existing recreational areas because a Feature Design Memorandum is not required for such work. (Chapter 8)

14. To provide management guidelines designed to optimize public use of the project, minimize environmental damage, and facilitate project operations and management. (Chapter 9)

15. To identify and discuss any unique or special problems that characterize and have an effect on the development and management of the project. (Chapter 11)

C. Master Plan Update Format. This master plan has been divided into five major parts. Part I consists of an inventory of the various natural and cultural resources that characterize John H. Kerr Reservoir, an analysis of projected recreation demand, and a summary of coordination efforts with other agencies. Part I of the plan was developed utilizing a variety of existing data sources provided by local, state, and federal agencies, information obtained from several on-site investigations, coordination with various state agencies, and established planning and design procedures. In addition, the results of the separate Environmental Inventory and Analysis (Appendix G) and Archaeological Survey (Appendix H) that were prepared in conjunction with this Master Plan Update have been incorporated into Part I of the plan.

Part II begins with a synthesis of the resource inventory and recreation needs analysis conducted in Part I. Based on the results of this synthesis, specific resource use objectives and a plan for the physical development of the project are presented. The physical development plan includes land and water use allocations, conceptual site development plans, and general recommendations for trail and interpretive facility development. Part II concludes with a presentation of facility rehabilitation design criteria.

Part III presents guidelines for the preparation of the detailed management plans required as appendices to the master plan. These guidelines address the purpose and scope of each of the required appendices as well as unique characteristics of John H. Kerr Dam and Reservoir as they relate to the preparation of these plans. No specific recommendations are made since these will be addressed in the appropriate appendix.

Part IV presents cost estimates for the recreation site development proposed in Part II. Included are estimates for the rehabilitation of existing facilities as well as the proposed development of new facilities. These cost estimates relate directly to the design criteria established in Part II and Exhibit A.

Part V presents a discussion of special problems at the Kerr Reservoir project.

D. Project Mapping. Particular emphasis has been placed on a complete graphic analysis of all major resource and development features at John H. Kerr Reservoir. All of the mapping associated with this study has been prepared in two formats. The first format consists of a "working file" set of maps. These maps were produced on 30" x 42" stable-based mylar in a manner that will allow full size reproduction utilizing standard ozalid print equipment. The map title and scale of each working file map is illustrated in Table 1-02. These maps were developed to illustrate as much data as possible as an aid in the day-

to-day management, development and operation of the project. These working file maps will be maintained at the Wilmington District Office. Copies of these maps are available to the resource manager, district personnel and other interested parties on request.

The graphic scale selected for each working file map was considered to be the minimum scale that could be utilized in assembling and recording the abundance of base data to be considered. However, it was recognized that it was not practical or economically feasible to include all of these maps (226 sheets) in the final master plan document. Furthermore, a graphic tool was needed to give planners and project managers a generalized overview of each resource. Therefore, a second set of maps were prepared for inclusion in a separate map portfolio at a size of 14" x 21.5". These maps were prepared in color to maximize their clarity and usefulness. The scale of each portfolio map (at the final portfolio size) is presented in Table 1-02.

TABLE 1-02
MASTER PLAN MAPPING
JOHN H. KERR DAM & RESERVOIR

MAP TITLE	WORKING FILE MAPS (30" x 42" Black & White Format)		FINAL PORTFOLIO MAPS (14.5" x 21" Color Format)	
	NO. OF SHEETS	GRAPHIC SCALE	NO. OF SHEETS	GRAPHIC SCALE
<u>Environmental Inven-</u> <u>tory</u>				
Existing Land Use	10	1" = 2000'	2	1" = 8000'
Cultural Influences	10	1" = 2000'	2	1" = 8000'
Archaeological and Historical Sites	10	1" = 2000'	2	1" = 8000'
Aspect	10	1" = 2000'	-	Not Included
Slope Analysis	10	1" = 2000'	2	1" = 8000'
Vegetation	33	1" = 1000'	2	1" = 8000'
Wildlife Habitat Quality	10	1" = 2000'	2	1" = 8000'
Soils and Water Quality	10	1" = 2000'	2	1" = 8000'
Soils Series	10	1" = 2000'	-	Not Included
Geology	10	1" = 2000'	2	1" = 8000'
Aquatic Habitat Classi- fication	10	1" = 2000'	2	1" = 8000'
Natural Resource Composite	10	1" = 2000'	2	1" = 8000'

TABLE 1-02 (CONT'D.)

MAP TITLE	WORKING FILE MAPS (30" x 42" Black & White Format)		FINAL PORTFOLIO MAPS (14.5" x 21" Color Format)	
	NO. OF SHEETS	GRAPHIC SCALE	NO. OF SHEETS	GRAPHIC SCALE
<u>Planning Concepts</u>				
Water Zoning	2	1" = 4000'	2	1" = 8000'
Real Estate	10	1" = 2000'	2	1" = 8000'
Operation and Maintenance Map	2	1" = 4000'	2	1" = 8000'
Jurisdictional Map	2	1" = 4000'	2	1" = 8000'
Net Usable Recreation Lands	10	1" = 2000'	2	1" = 8000'
Project Location Map	1	1" = 13 miles	1	1" = 26 miles
Site Location Map	1	1" = 8000'	1	1" = 16000'
Land Allocations Plan	10	1" = 2000'	2	1" = 8000'
Index to Site Plans	2	1" = 4000'	2	1" = 8000'
Recreation Use Pattern Plan	2	1" = 4000'	2	1" = 8000'
Interpretive Features	2	1" = 4000'	2	1" = 8000'
<u>Site Development Plans</u>				
Orthophotographic Base illustrating Site Analysis, Existing Facilities, and Proposed Facility Development	39	1" = 400'	39	1" = 800'
TOTAL NO. OF MAPS PER SET	226		79	

CHAPTER 2

NATURAL RESOURCE ANALYSIS

CHAPTER 2

NATURAL RESOURCE ANALYSIS

2-01 INTRODUCTION

This chapter includes an inventory and analysis of the natural resources of the John H. Kerr area. Included are discussions of the regional location of the project and the river basin in which it is located; as well as project features such as climate, topography, geology, soils, hydrology, flora, fauna, and visual quality. Where appropriate, these features are discussed in terms of the potentials and limitations they present for the development, operation, and management of John H. Kerr Reservoir. The information presented in this chapter was used to develop specific resource use objectives, to match land use categories to resource capabilities, to guide the siting of new recreation development, and to establish goals for resource use and management.

In addition to the project wide analysis included in this chapter, each of the existing and proposed recreation areas was analyzed in more detail. These site level analyses are presented in Chapter 7.

2-02 PROJECT LOCATION

The John H. Kerr Dam is located in Mecklenburg County, Virginia, on the Roanoke River, about 179 miles above its mouth. The dam is located approximately 20 miles upstream from the Virginia-North Carolina State line; 20 miles downstream from Clarksville, Virginia; and about 80 miles southwest of Richmond, Virginia. The reservoir extends into portions of Mecklenburg, Charlotte, and Halifax Counties in Virginia; and Warren, Vance, and Granville Counties in North Carolina. The project is quite accessible to the principal highways in the region, lying adjacent to U.S. Highways 1, 15, 58, 158, 360, and Interstate 85. Virginia Highway 4 crosses the dam, and secondary state and county highways provide access to the reservoir at many points. The regional location of the project in relation to nearby cities, towns, highways, and major outdoor recreation areas is shown on Plate 2-01 (included in separate map portfolio).

2-03 RIVER BASIN DESCRIPTION

John H. Kerr Reservoir is located within the Roanoke River Basin. The basin is located in the southern part of Virginia and in the northern part of North Carolina. It is bordered on the north by

the watershed of the James and the Chowan Rivers, on the west by the Tar, Neuse, Cape Fear, and Pee Dee Rivers. The Roanoke River rises on the eastern slope of the Appalachian Mountains, flows in a southeasterly direction toward the Atlantic Coast, and empties into Albemarle Sound approximately seven miles below Plymouth, North Carolina. The Roanoke River Basin is approximately 220 miles long and has a drainage area of 9,580 square miles. The drainage area above the John H. Kerr Dam includes 7,800 square miles. Figure 2-01 shows the Roanoke River Basin and the location of John H. Kerr Reservoir within it.

2-04 PHYSICAL GEOGRAPHY AND TOPOGRAPHY

Although the Roanoke River Basin spans four physiographic regions, the majority of the watershed, including John H. Kerr Reservoir, lies within the Piedmont Plateau region. The Kerr Reservoir area is characteristic of the Piedmont Plateau, and consists of rolling hills and relatively level valleys. The flood plains along the Roanoke and Dan Rivers range from 1,400 to 2,000 feet in width. Many of the slopes near the reservoir are steep, and erosion is generally severe where natural vegetation has been disturbed or where the banks are exposed to frequent wave action. The slopes extending to the south bank of the reservoir are generally less steep than those on the north bank.

Slope is one of the major environmental factors determining the capability of land to support various land use activities. The working file Slope Analysis Maps (1" = 2000') illustrate three slope ranges (0-8%, 8-16%, and greater than 16%). The portfolio maps (Plates 2-02 and 2-03 at 1" = 8000') are limited to 0-8% and greater than 8% due to scale limitations. The potential of each slope range for intensive recreational development is described below.

A. 0-8%. In terms of slope, lands in this range are quite suitable for all types of recreation development. Major land areas in this slope range are generally confined to broad ridgetops, natural floodplains, and secondary terraces that occur along the upper reaches of the reservoir's tributaries. Many of these areas are presently or were formerly used for agriculture. Therefore, vegetation on these areas generally consists of pasture grasses or relatively young forest stands. Based on slope alone, these areas provide the best opportunity for intensive recreation development, except where poor drainage limits their suitability. In most cases, existing and proposed recreation areas include a considerable percentage of lands in the 0-8% slope category.

B. 8-16%. Lands in this slope range are quite extensive on the project and present only minor constraints to intensive recreation

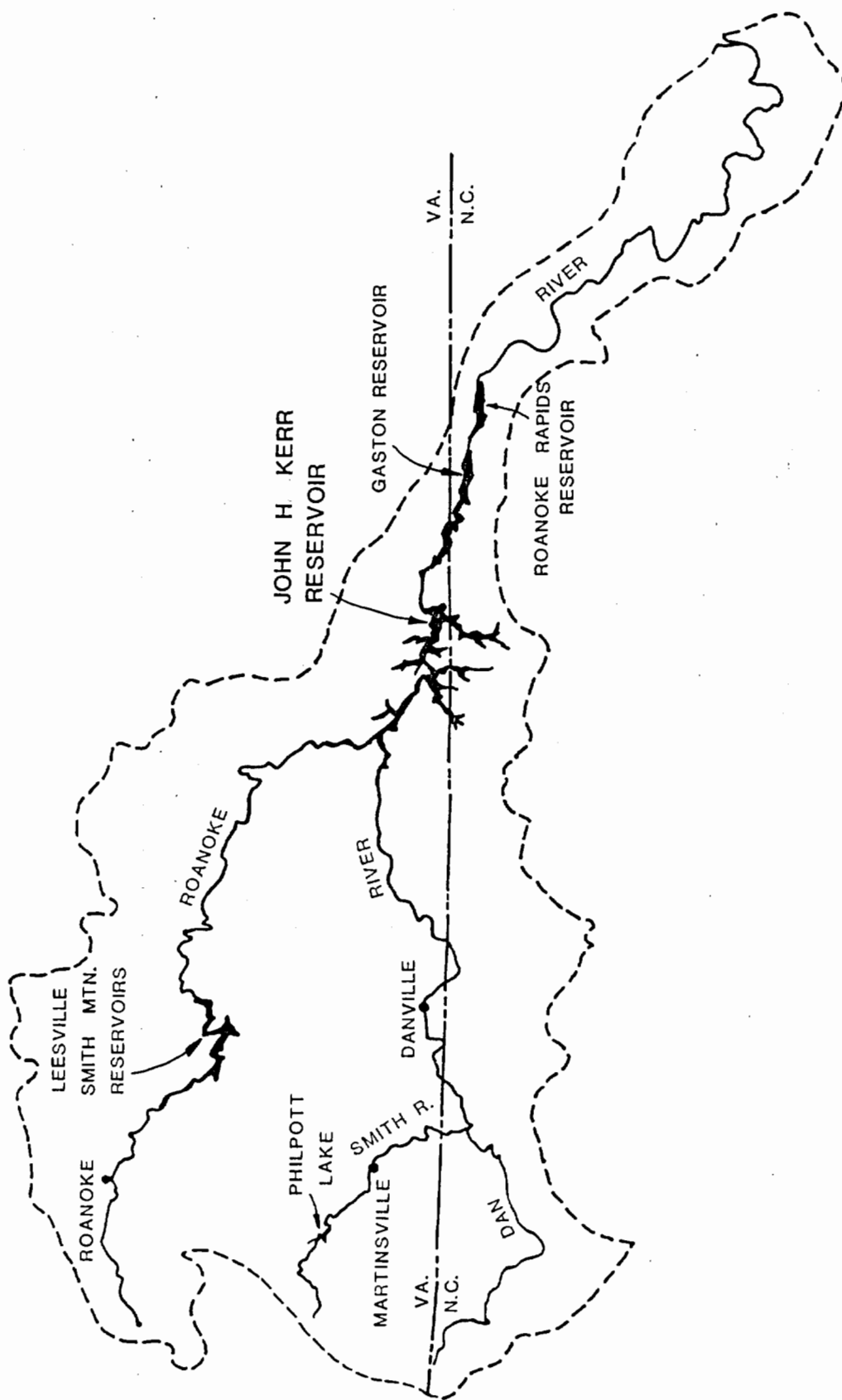


FIGURE 2-01
ROANOKE RIVER BASIN

development. These slopes are well suited for medium density camping, picnic areas, and trail development. Site design must be sensitive to these slopes and topographic aspect becomes an important consideration. Roads and parking areas should parallel the contours and runoff should be controlled to reduce soil erosion. This slope range typically occurs on hillsides and is rather evenly dispersed throughout the project.

C. Greater than 16%. Land areas that have slopes in excess of 16% should generally be avoided for recreation development. The costs of development on these lands are relatively high and the potential for adverse environmental impacts are considerable. Trails can be constructed through these areas if they generally parallel the contours and if the steepest areas are protected by steps and other reinforcement techniques. In general, these areas are best utilized as natural buffers and for forest, wildlife, and watershed conservation. Slopes in this range are generally limited to hillsides sloping toward the reservoir above Bluestone Creek, and on the Panhandle Peninsula.

2-05 CLIMATE

The climate of the region is temperate, characterized by warm summers and cold but generally not severe winters. The growing season is relatively long and zero temperatures are rare. Annual precipitation is moderate, averaging 45 inches per year, and fairly evenly distributed throughout the year. Table 2-01 presents a summary of climatological data for the project area.

Diagrams of sun position and wind direction and velocity are presented in Figures 2-02 and 2-03. These diagrams were also shown on the working file Slope Analysis Maps. Average temperature and average precipitation by month are presented in Figures 2-04 and 2-05.

Information related to regional climatic factors is valuable in understanding regional ecology, hydrology, vegetation, etc. More important to the location of recreational development are some of the microclimatic factors such as aspect. The relationship of aspect to the location of recreation facilities is considered in Exhibit A, Facility Design Criteria.

2-06 GEOLOGY

A. Introduction. During the preparation of this document it was noted that there was a lack of base data available on the geology of the Kerr Reservoir area. Therefore, particular emphasis was placed on a baseline evaluation of this resource. The following information on geology is considerably more detailed than other sections of this

TABLE 2-01
CLIMATOLOGICAL SUMMARY

<u>Average Annual Temperature</u>	59.8°F
Range	(50°F - 70°F)
Average Minimum Monthly Temperature (January)	41.7°F
Average Maximum Monthly Temperature (July)	78.4°F
<u>Average Annual Precipitation</u>	45.5 inches
Range	(34 in. 1940, 1965; 64 in. 1936)
Average Minimum Monthly Precipitation (October)	2.68 inches
Average Maximum Monthly Precipitation (July)	5.95 inches
<u>Average Yearly Snowfall</u>	7.40 inches
Range	(trace - 25 inches)
<u>Average Mean Relative Humidity</u>	71%
Mean Minimum Monthly Humidity (February)	60%
Mean Maximum Monthly Humidity (August)	82%
<u>Average Annual Windspeed</u>	8.0 mph
Average Minimum Monthly Windspeed (October)	6.5 mph
Average Maximum Monthly Windspeed	9.6 mph

Source: Environmental Impact Statement, Henderson, North Carolina
201 Wastewater Treatment System, U. S. Environmental Protection Agency, November, 1976.

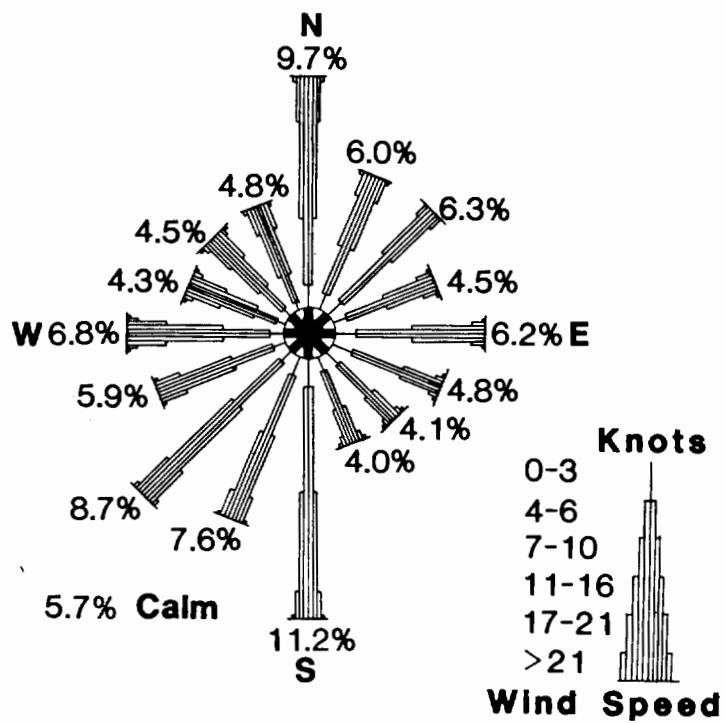


FIGURE 2-02
WIND DIRECTION AND FORCE, JOHN H. KERR RESERVOIR

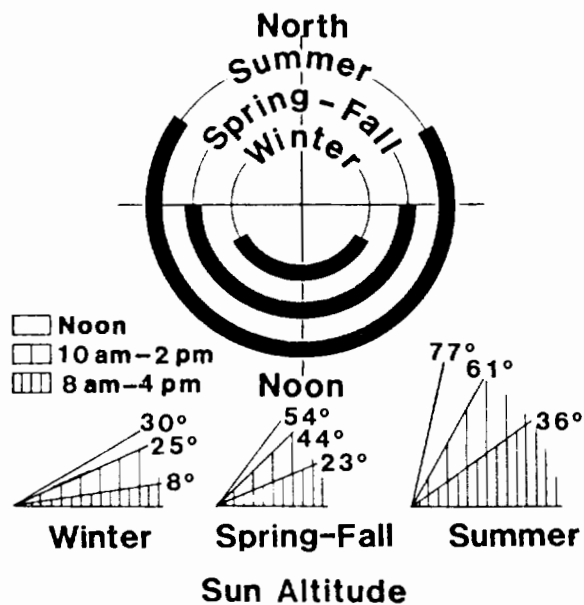


FIGURE 2-03
SUN DIAGRAM, JOHN H. KERR RESERVOIR

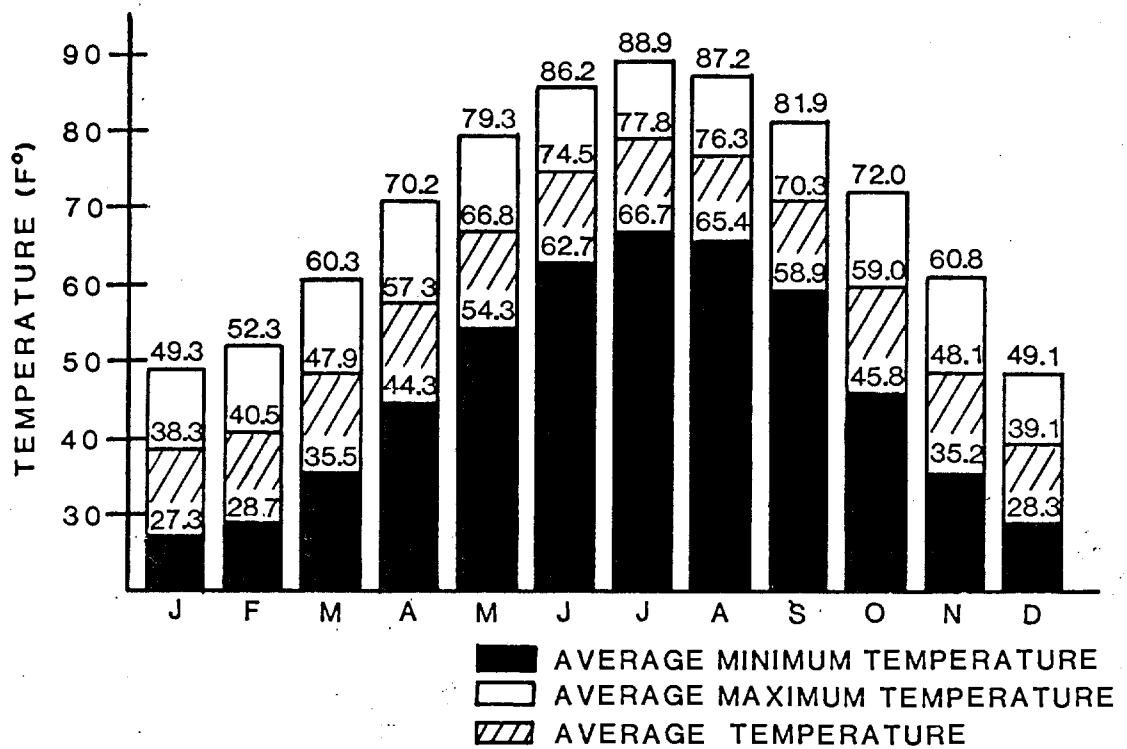


FIGURE 2-04
AVERAGE MONTHLY TEMPERATURES

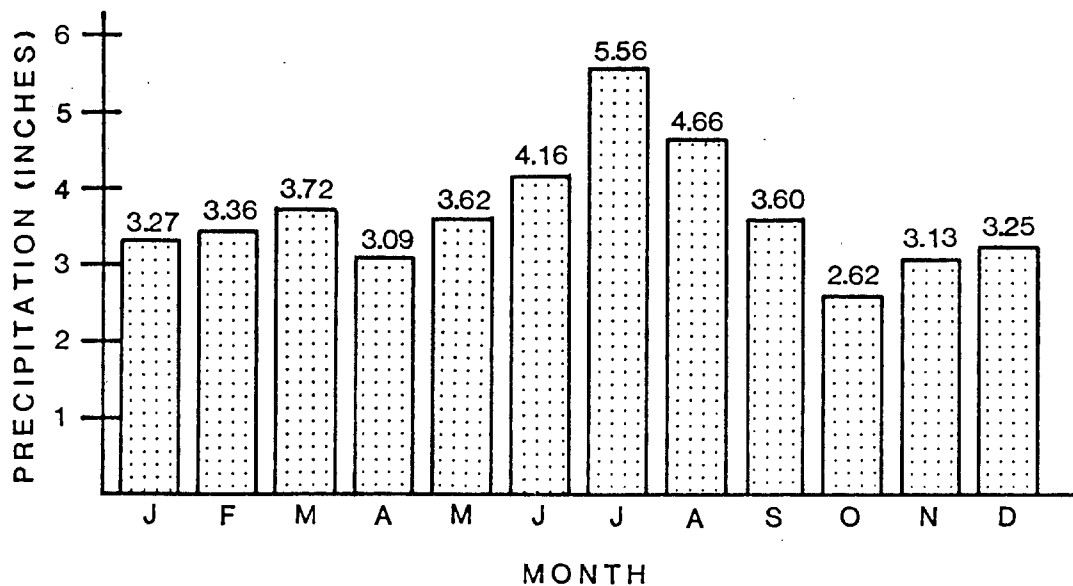


FIGURE 2-05
AVERAGE MONTHLY PRECIPITATION

chapter since it was felt that the results of this investigation should be documented for future use, and because the geology map is useless without a discussion of how it was developed. The reader that is not interested in the detailed explanation provided below should refer to the tables and the summary provided in part F.

B. General. The John H. Kerr Reservoir is located in the Piedmont region of Virginia and North Carolina. This old, structurally complex region contains a wide variety of igneous and metamorphic rocks which have been heavily weathered due to long exposure at the earth's surface. The layer of highly weathered residual overburden, commonly referred to as saprolite, varies in thickness from over 40 feet in topographically flat areas to none in high-slope areas where bedrock outcrops. Soil development in the saprolite varies from good to poor, depending upon local slope and soil water leaching conditions. The bedrock-saprolite interface is transitional and exposed bedrock tends to be highly weathered.

The Piedmont region is structurally complex, with a long and varied past. The complex outcrop patterns of frequently highly metamorphosed igneous and metamorphic rocks, combined with the presence of extensive fault systems, indicate an active tectonic history. In the Kerr Reservoir area the youngest indication of activity consists of intrusive dikes of Triassic age, which ended 180 million years ago. No active fault systems are known for the area, and although minor tremors do occur throughout the Piedmont region, the earthquake hazard for this area is considered low.

C. Mineral Deposits and Building Materials. North Carolina and Virginia are important sources of many minerals, such as feldspar, mica, lithium, etc., which are found in pegmatite vein deposits scattered throughout the Piedmont region. Several rock types found in the region, such as granite, slate, and marble are quarried for building stone. Dimensional stone, concrete aggregate, and road base are representative uses for these materials. Pegmatite veins are common in all of the rock types in the Kerr Reservoir project area, but they appear to be composed almost exclusively of quartz. The only known mine in the project area is at Tungsten, North Carolina, where vein deposits of tungsten bearing minerals were extracted until about ten years ago.

Building materials have been quarried in the Kerr Reservoir area intermittently for many years. A currently (1979) inactive quarry operated by Vulcan Materials Company in the general reservoir area provided rock fill for the John H. Kerr Dam, as well as material for the Hampton Roads Tunnel. Other locations around the reservoir have provided road base and riprap.

D. Interpretation of Rock Units. Determination and prediction of probable response of rock materials to construction, excavation, and

loading is dependent upon an accurate identification of the rock materials involved. In the Kerr Reservoir project area, the thickness of the weathered layer, the gradational character of many of the rock types present, and differential interpretation of available data by people working in the two states containing the project area combine to make exact interpretations of site geologic conditions difficult. There are nine rock units mapped in the project area in Virginia, and six units in North Carolina (Table 2-02). In most cases, adjacent areas are roughly comparable in terms of rock type and outcrop pattern, based upon careful comparison of the written descriptions of the rock types.

It should be noted that the dashed rock type contact lines shown on the Geologic Map (Plates 2-04 and 2-05) represent inferred or interpreted contacts. There are five questionable locations, labeled 1 through 5 on the maps, where either the contacts or the rock types do not match across the state boundaries.

At location 1, the Redoak granite outcrop in Virginia appears to pinch out at, or just south of, the state line, and is probably present only to a very limited extent in North Carolina. Similarly, the "metamorphosed volcanics" (delineated as v) outcropping in Virginia at location 2 probably extend under Kerr Reservoir into North Carolina, and either pinch out or connect with the northward extending outcrops of "felsic volcanics" (delineated as fvs) in North Carolina. Location 3 apparently represents a similar pinching out of the "mafic volcanics" (delineated as mvs) as they extend north into Virginia from North Carolina. None of these locations provide any real interpretation problems. Location 5 is indicative of the more detailed classification scheme employed for the Virginia map. If the contact was extended south into North Carolina, it would pass just to the west of the project area.

The only questionable location of any real significance, location 4, shows conformable contacts between the two states, with rock type descriptions that are incompatible. The Redoak granite, in Virginia, is described as a medium-grained biotite-granite with a high percentage of quartz and roughly equivalent portions of plagioclase feldspar and orthoclase feldspar. The southern extension of this rock body into North Carolina is described as a gabbro, a coarse-grained, dark rock normally containing a high percentage of plagioclase feldspar. Examination of mapping trends in both state maps tends to reinforce the Virginia interpretation, but complete resolution of the question would depend upon direct observation of the outcrop areas in both states. For the purposes of this report, the Virginia identification has been accepted.

E. Engineering Properties. The strength and engineering properties of various kinds of rock materials are dependent upon the

TABLE 2-02
DESCRIPTIONS OF ROCK UNITS
JOHN H. KERR RESERVOIR

<u>NORTH CAROLINA</u>		
<u>Map Symbol</u>	<u>Name</u>	<u>Description</u>
mgn	Mica Gneiss:	Predominantly mica gneiss; with mica schist and granitoid layers. Contains small inclusions of crystalline limestone and marble, granite, diorite, and pegmatite veins. Usually deeply weathered in outcrops.
gr	Granite:	Granite; massive, infrequently jointed, medium to coarse grained, occasionally porphyritic. Includes small bodies of diorite, pegmatite, and mafic dikes.
di-gb	Diorite-Gabbro:	Diorite, gabbro, and intermediate stages; massive with widely spaced joints. Contains small inclusions of granite and pegmatite.
fvs	Felsic Volcanics:	Rhyolitic and dacitic flows, tuffs, and breccias; flows primarily rhyolite, tuffs and breccias range from rhyolite to dacite. Usually metamorphosed.
mvs	Mafic Volcanics:	Andesite and basalt flows and andesitic tuffs and breccias. Contains high epidote content, frequently called "greenstone."
msh	Mica Schist:	Chiefly mica schist, includes mica gneiss and a wide variety of other gneisses and schists.
<u>VIRGINIA</u>		
hgb	Hornblende Gabbro and Gneiss:	Gabbro, diorite, and gneiss with high hornblende and chlorite content.
mgn	Gneiss:	Metamorphosed igneous and sedimentary rocks.

TABLE 2-02 (CONT'D.)

<u>Map Symbol</u>	<u>Name</u>	<u>Description</u>
v	Metamorphosed Volcanic Sedimentary Rocks:	Metamorphosed volcanic flows and tuffs.
PzpCro	Redoak Granite:	Biotite and muscovite granite; granite gneiss to granodiorite.
PzpCvg	Virgilina Group:	Metamorphosed andesite flows and tuffs.
PzpCvs	Virgilina Group:	Slate, schist, and phyllite.
R d	Igneous Rocks:	Intrusive dikes and sills of Triassic age; diabase and gabbro.
R n	Newark Group:	Arkosic sandstones of Triassic age; argillaceous sandstones and shales.
ghgn	Granite and Hornblende Gneiss:	Interlayered mica, quartz, feldspar gneiss and hornblende, feldspar, mica gneiss.

- Source:
1. N. C. Dept. of Conservation and Development, Division of Mineral Resources. Map compiled in 1958.
 2. Commonwealth of VA. Dept. of Conservation and Economic Development, Division of Mineral Resources. Map compiled in 1963.
 3. Consultant Interpretation.

rock's constituent minerals and their lineation, uniformity, jointing, and degree of weathering. Rock units present in the Kerr Reservoir project area are igneous and metamorphic and cementation factors do not apply, but all other factors mentioned must be considered. Most of the rock units in the area are fairly massive, sparsely jointed, and deeply weathered. Degree of uniformity varies considerably due to the variable presence of pegmatite veins. With the possible exception of the fine grained metamorphic units such as slate and schist, rocks of the major units in the project area are competent and should be capable of supporting roads and small structures. The limiting factors are the degree of weathering and the proximity and orientation of joints and steep slopes. These units should also be capable of holding very steep cuts in unweathered rock, provided there

are no adjacent joints subparallel to the cut. In addition to joint patterns and degree of weathering, competency of schist, shale, phyllite, and some gneiss is dependent upon schistosity orientation relative to slope orientation, proximity, and degree.

Table 2-03 presents a generalized interpretation of the engineering properties of the major rock units in the Kerr Reservoir area. An attempt has been made to address the effects of major factors mentioned above, but the potential planner should realize two important limitations in its use.

First, Table 2-03 refers only to rock conditions, and does not take into account the probable response of any overlying saprolite or soil. The section on soils contains an equivalent table based upon soil type which should also be consulted with respect to any location under consideration. Information from the rock condition and soil condition tables can then be combined to obtain a more complete description of general conditions to be expected.

Second, both of these tables are by nature very general and refer to average conditions. They provide an excellent means of obtaining a "first approximation" of site conditions, but under normal circumstances any potential building site or transportation route should be examined by a competent geologist or geotechnical engineer. The more variable the site and the more potentially significant or sensitive the installation, the more important such an investigation becomes.

There are three sections in Table 2-03, dealing with foundation potential, slope stability, and excavation conditions, respectively. For the sake of simplicity, the rock units have been combined into five groups according to similar lithology. Each section presents a range of conditions expected for each rock-type group as influenced by a set of factors. The influencing factor columns are divided into two subcolumns representing opposing extremes in possible conditions for each factor. The suitability ratings are subjective, and represent the probable effect on a given rock-type group of a certain influencing factor, according to the development stage of that factor. During interpretation, the effect of each factor is determined independently according to the local development level expected for that factor, and the suitability ratings derived for all of the factors are then examined to determine total site suitability for the project under consideration.

F. Summary of Geologic Features. To summarize, the John H. Kerr Reservoir is situated on the old, deeply weathered, igneous and metamorphic rocks of the Virginia and North Carolina Piedmont region. There are no regionally significant aquifers within these materials, seismic activity is present in low frequency and intensity, and the

TABLE 2-03
ENGINEERING PROPERTIES OF ROCK UNITS
JOHN H. KERR RESERVOIR

Rock Units	Unweathered	Weathered	Uniform Composition	Non-Uniform ^a Composition	Lightly Jointed	Heavily Jointed	Horizontal Schistosity	Angled Schistosity	Low Slope	High Slope
Foundations for Small Structures and Light Roads										
1 ^b	good ^e	fair-good	good	fair-good	fair-good	poor-good	na ^e	na	good	poor-good
2	excellent	fair-good	excellent	fair-good	good-excellent	poor-good	na	na	good-good	fair-good
3	good	fair-good	good	fair-good	fair-good	poor-good	na	na	excellent	fair-good
4	good	poor-good	good	poor-good	good	poor-good	na	na	good	poor-good
5	fair-good	poor-good	fair-good	poor-good	fair-good	poor-good	fair-good	poor-good	fair-good	poor-good
Steep Cut Stability										
1	good-excellent	fair-good	good-excellent	fair-excellent	good-excellent	poor-good	na	na		
2	excellent	fair-good	excellent	fair-excellent	good-excellent	poor-good	na	na		
3	good-excellent	fair-good	good-excellent	fair-excellent	good-excellent	poor-good	na	na		
4	good-excellent	fair-excellent	good-excellent	fair-excellent	good-excellent	poor-good	na	na		
5	excellent	excellent	excellent	fair-excellent	good-excellent	poor-good	na	na		
	fair-good	poor-fair	fair-good	poor-good	fair-good	poor-fair	fair-good	poor-good		
Excavation Potential										
1	poor ^d	poor-fair	poor ^d	poor	poor ^d	poor-fair ^d	na	na		
2	poor	poor-fair	poor	poor	poor	poor-fair	na	na		
3	poor	poor-fair	poor	poor	poor	poor-fair	na	na		
4	poor-fair	poor-fair	poor	poor	poor	poor-fair	na	na		
5	poor-fair	fair	poor-fair	poor-fair	poor-fair	fair-good	poor-fair	fair-good		

a. Rock type uniformity, non-uniform implies inclusion of small bodies of other units, or numerous pegmatite veins.

b. Rock Unit Groups as defined in Table 2-02: 1. mgn, mgn, msh 2. gr, di-gb, PzpGro, grgn 3. hgb, T d 4. fvs, mvs, v, PzpGvg 5. PzpGvs, ghgn

c. Not applicable

d. Possible source of construction materials

e. Classification system: excellent, good, fair, poor

only currently mined geologic material is granite. With the possible exception of schistose rocks, most of the area's rocks are difficult to excavate, unlikely to slide, and make good foundations for small structures. Modifying factors affecting these characteristics include degree of weathering, jointing, and topographic slope. General conditions expected are presented in Table 2-03 to aid in preliminary determination of potential construction site suitability. Final site selection and project design should include a site inspection by a geologist or geotechnical engineer.

2-07 HYDROLOGY

A. Surface Water. The John H. Kerr Reservoir at normal pool level, elevation 300 feet mean sea level, is 39 miles long, has a shoreline length of about 800 miles, and a water-surface area of approximately 48,900 acres. The pool extends about 39 miles up the Roanoke River and about 19 miles up the Dan River above its junction with the Roanoke River.

1. Water Level Fluctuation. The project design and current plan of operation provide for a full flood control pool at elevation 320 feet above mean sea level and a full power pool elevation of 300 feet. In general, the reservoir will fill during the winter and spring months and be drawn down gradually during the summer and fall. From a typical high of 302 feet mean sea level in May or June, the planned water level in the reservoir is maintained at 299.5 through September and then falls gradually to a low of 295.5 feet in December, at which time winter rains start the filling process. The water level will usually fluctuate within a 2.5-foot range during the recreation season of June through September. The reservoir elevation will vary from the expected levels indicated above during periods of abnormal streamflow caused either by heavy rainfall or prolonged drought.

2. Water Quality. The water quality of the reservoir was assessed by Weiss (1978). The water quality was generally rated high for both arms of the reservoir except in the upper portion of Nutbush Creek. The area of the Nutbush Creek arm of Kerr Reservoir above the Route 1308 bridge was considered low in quality due to low dissolved oxygen and abnormally high conductivities. These water quality parameters are related to the fact that a sewage treatment plant discharges its effluent directly into this tributary and to the influence of a pickle plant which has recently been closed.

The Environmental Inventory and Analysis that was conducted as a supporting study for this master plan included the results of water quality samples taken from the 15 major tributary streams of the reservoir. The parameters that were sampled included pH, alkalinity, turbidity, dissolved oxygen, temperature, and conductivity. The sampling

stations are indicated on Plates 2-06 and 2-07. Average values for the six water quality parameters for each sampling station are presented in Table 2-04.

TABLE 2-04
AVERAGE VALUES OF WATER QUALITY PARAMETERS
FOR FIFTEEN TRIBUTARIES, JOHN H. KERR RESERVOIR

<u>Station</u>	<u>Temp.</u> <u>°C</u>	<u>D.O.</u> <u>(mg/l)</u>	<u>pH</u>	<u>Alkalinity</u> <u>(mg/l</u> <u>CaCO₃)</u>	<u>Turbidity</u> <u>NTU</u>	<u>Conductivity</u> <u>(μmho's)</u>
Anderson Swamp Creek	20	8	6.9	27.3	17	39
Nutbush Creek	17	6.7	6.9	83.5	35	357
Flat Creek	17.5	7.4	6.9	35	10.5	46.3
Beaver Pond Creek	14.6	8.5	6.8	39	19.5	52
Grassy Creek	14.7	8.5	6.8	35	16.5	35
Beech Creek	15.3	9	6.9	31	13	24
Little Buffalo Creek	16.4	8.4	6.7	29	12.5	47
North Fork, Aarons Creek	15.9	8.6	6.8	36	9	56
Hyc0 River	18	8.6	6.8	26	35	50
Grassy River ¹	16.2	9.5	7.2	73	10	80
Butchers Creek	16.8	7.8	6.9	41	7	48
Sandy Creek (unnamed Trib.)	16	7.3	6.8	37	9	49
Little Bluestone Creek	16.2	8.4	7	54	15	58
Bluestone Creek	16.9	8.2	7.1	46	10	54
Difficult Creek	16	9.7	7.1	33	15	37

¹This creek is a tributary of the Dan River and not the same as the other, larger Grassy Creek.

Source: Based on four seasonal measurements during the period of Fall 1978 through Summer 1979.

B. Groundwater. Piedmont region rocks were formed under high temperature and pressure conditions, and have been subsequently altered through cycles of compression and partial melting. Except for some volcanic rocks, they contain little or no primary porosity or permeability. Therefore, groundwater presence and movement is limited to fractures formed either through rock deformation or through release of compression. Fractures are not extensive in the Kerr Reservoir area. Fractures in the Piedmont region rarely extend to a depth of more than 150 feet, and almost never deeper than 300 feet. Groundwater is present under watertable conditions in these fractures and in the overlying saprolite mantle in quantities normally sufficient for domestic or low intensity recreation use. No large quantity, areally significant recharge areas or aquifers exist under the project area. Similarly, almost any location within the project area acts to recharge that portion of the water-table aquifer adjacent to it, but each area is of strictly local significance. The possible groundwater quality impact due to recreational or waste disposal use of an area would be site specific, and limited in areal extent.

C. Suitability of Existing Wells. Since almost all potable water supplies for recreation developments at John H. Kerr Reservoir are obtained from groundwater sources, an analysis of existing wells on project lands was conducted. The purpose of this analysis was to identify the suitability of each existing well to support recreation facility development. Available well test data did not include figures related to drawdown or recharge rates so the analysis had to be based on several assumptions. It was assumed for the basis of this analysis that the test yield of a well could be maintained for a certain number of hours based on the length of the well's test. It was assumed that a well tested for one or two hours could maintain the test yield for five hours. Similarly a well tested for three to four hours could maintain the test yield for ten hours. Test data, yield assumptions and well suitability ratings are given in Table 2-05. Well suitability ratings are based on their total daily yield and can be related to the size of recreation development a well can support. The daily yields needed for each suitability class are footnoted in Table 2-05. The location and suitability class of each well are also shown on the Geology Map in the working file only.

D. Anticipated Yield of New Wells. The volume of groundwater available is closely related to the geological formation underlying an area. The composition of underlying rock, specifically its porosity and permeability, as well as topographic position contribute to the yield of groundwater from a well. For the purposes of the present analysis, data on yield for wells in geologic formations in North Carolina was extrapolated to similar formations in Virginia to predict yields of wells by geologic formation as shown in Table 2-06.

TABLE 2-05

SUITABILITY OF EXISTING WELLS;
JOHN H. KERR RESERVOIR*

Well No.	GPM ¹	GPH	Test ¹ Hrs.	Assumed ² Yield	Suitability ³ Class
1.	20.0	1200	3	12000	I
2.	6.5	390	2	1950	II
3.	1.0	60	3	300	III
4.	20.0	1200	2	6000	I
5.	8.5	510	4	5100	I
6.	4.5	270	12	5400	I
7.	5.0	300	6	4500	I
8.	1.5	90	1	450	III
9.	1.5	90	1	450	III
10.	25.0	1500	8	22500	I
11.	0.5	30	1	150	III
12.	8.5	510	6	7650	I
13.	18.0	1080	1	5400	I
14.	0.7	42	2	210	III
15.	10.0	600	12	12000	I
16.	25.0	1500	6	22500	I
17.	9.0	540	1	2700	II
18.	No Data Available				
19.	15.0	900	12	18000	I
20.	15.0	900	2	4500	I
21.	1.5	90	12	1800	II
22.	1.7	102	3	1020	III
23.	8.0	560	12	11200	I
24.	2.0	120	1	600	III
25.	6.0	360	2	1800	II
26.	7.5	450	12	9000	I
27.	9.5	570	12	11400	I
28.	5.0	300	12	6000	I
29.	10.0	600	12	12000	I
30.	25.0	1500	12	30000	I
31.	25.0	1500	12	30000	I
32.	1.5	90	12	1800	II
33.	2.0	120	1	600	III
34.	4.0	240	1	1200	III
35.	5.0	300	2	1500	III
36.	10.9	654	2	3270	II
37.	13.0	780	12	15600	I
38.	6.5	390	12	7800	I
39.	25.0	1500	8.5	22500	I
40.	0.7	42	1	210	III

TABLE 2-05 (CONT'D.)

Well No.	GPM ¹	GPH	Test ¹ Hrs.	Assumed ² Yield	Suitability ³ Class
41.	10.0	600	12	12000	I
42.	0.7	42	2	210	III
43.	5.5	330	5	3960	II
44.	7.5	450	12	9000	I
45.	1.0	60	4	600	III
46.	15.0	900	1	4500	I
47.	2.0	120	2	600	III
48.	14.5	870	12	17400	I
49.	8.4	504	12	10080	I
50.	10.0	600	24	14400	I
51.	5.5	330	24	7920	I
52.	6.0	360	24	8640	I
53.	6.5	390	6	5850	I

1. Information on gallons per minute and test hours is from well testing records on file with the Wilmington District, Corps of Engineers.

2. Assumed Yield is based on a conservative assumption of how long a well will produce at the rate tested. The assumptions used are:

Hours Tested	Producing Hours
1 - 2	5
3 - 4	10
5	12
6 - 9	15
12	20
24	24

3. Suitability Classes were assigned on the basis of the following assumed yields:

Greater than 4500 gal./day	Class I
1800 to 4500 gal./day	Class II
Less than 1800 gal./day	Class III

*The location and suitability class for each well are shown on the Geology Map in the working file only.

TABLE 2-06
ANTICIPATED YIELD OF WELLS BY
GEOLOGIC FORMATION; JOHN H. KERR RESERVOIR

Formation	Yield (gpm)	Range of Wells Tested	Percent Yielding 1 gpm or less
Mica Gneiss	16	0-295	5.8
Granite	17	0-90	3.7
Diorite-Gabbro	12	.5-75	3.4
Felsic Volcanics	19	3-64	0
Mafic Volcanics	12	.5-150	.8
Mica Schist	19	1-237	2.0
Hornblende Gabbro and Gneiss	17	1-50	8.3
Gneiss	16	0-295	5.8
Metamorphosed Volcanic Sedimentary Rocks	19	3-64	0
Redoak Granite	17	0-90	3.7
Virgiliana Group	19	3-64	0
Igneous Rocks	unpredictable		
Newark Group	6	0-25	18
Granite and Hornblende Gneiss	17	1-50	8.3

Source: Data adapted from Geology and Ground-Water Resources in the Raleigh Area North Carolina, N.C. Department of Water Resources, 1968.

As was stated earlier topographic position also influences the yield of a well. A general statement can be made that the highest yields will be from wells located in a draw, intermediate yields from slopes and flats, and the lowest yields will be from ridgetops. In areas where the adequacy of groundwater yield is questionable, a well located in a draw will generally optimize the available yield.

2-08 SOILS

A. General. Information on the location and characteristics of the various soil series that occur within the project boundaries was obtained from county soil surveys. Soils series provide the most useful information for a study conducted at the working file map scale of 1" = 2000'. As shown on the working file maps, forty-eight soils series have been identified on project lands.

B. Suitability Classes. Soils were grouped into three classes of suitability for intensive recreation based on soil survey ratings for camping, picnic areas, and septic tanks. The distribution of these three soil suitability classifications is shown on Plates 2-06 and 2-07. These suitability ratings do not consider limitations associated with steep slopes. Therefore, a particular land area that is suitable (based on the soil classification) may be rejected on the basis of steep slopes, or a variety of other resource factors.

1. Class I. These are the best soils for all types of intensive recreation. They have few or no limitations for camping, structures, roads, or septic tanks. Class I soils are generally deep, well-drained, and located in areas that are generally not susceptible to flooding.

2. Class II. These soils are usually acceptable for recreation development. They have moderate limitations, generally related to slow surface drainage or moderate percolation rates. Site design can overcome these soils limitations, although construction costs might increase.

3. Class III. These soils are unsuitable for intensive recreation. They have one or more of the following limiting characteristics:

- a. seasonal flooding
- b. slow permeability
- c. high water table
- d. shallow depth to bedrock

Table 2-07 indicates the suitability class and soil limitations for all soil series found on the John H. Kerr project.

TABLE 2-07

SUITABILITY AND LIMITATIONS OF SOILS
SERIES FOR INTENSIVE RECREATION

Soil Series	Suitability Class	Limitations
Abell	II	occasional flooding
Alamance	II	slow surface drainage
Altavista	III	seasonal flooding slow permeability
Appling	I	--
Augusta	III	seasonal flooding high water table
Buncombe	III	seasonal flooding sandy surface layer
Cecil	I	--
Chewacla	III	seasonal flooding slow permeability
Colfax	III	high water table
Congaree	III	seasonal flooding slow permeability
Creedmore	III	flooding slow permeability
Cullen	I	--
Davidson	II	slow surface drainage
Durham	II	slow surface drainage
Enon	III	slow permeability
Georgeville	II	moderate permeability
Goldston	III	shallow to bedrock
Granville	II	
Grover	I	--
Helena	III	slow permeability slow surface drainage
Herndon	II	slow surface drainage
Hiwassee	I	--
Iredell	III	slow permeability shallow to bedrock
Lloyd	II	moderate permeability
Louisa	III	shallow to bedrock
Louisburg	III	shallow to bedrock
Madison	II	moderate permeability
Masada	II	moderate permeability poor subgrade material
Mayodan	I	--
Mecklenburg	III	shallow to bedrock
Orange	III	high water table slow permeability

TABLE 2-07 (CONT'D.)

Soil Series	Suitability Class	Limitations
Pacalet	II	moderate permeability
Penn	III	poor upgrade material
Pinkston	III	shallow to bedrock
Roanoke	III	susceptible to erosion
Seneca	I	slow permeability
Starr	III	seasonal flooding
State	III	slow permeability
Toccoa	III	slow permeability
Turbeville	II	--
Vance	III	flooding
Wadesboro	II	flooding
Wedowee	II	flooding
Wehadkee	III	moderate permeability
White Store	III	slow permeability
Wickham	II	high water table
Wilkes	III	flooding
Worsham	III	shallow to bedrock
		susceptible to erosion
		moderate permeability
		shallow to bedrock
		slow permeability
		high water table
		slow permeability

Source: U.S.D.A. Soil Surveys for Halifax, Mecklenburg, and Charlotte Counties in Virginia; and Warren, Vance, and Granville Counties in North Carolina.

C. Distribution. The distribution of soils series and soil suitabilities is extremely variable. In many cases the best and worst soil series are located adjacent to each other. However, a general pattern of the distribution of soil suitability classes throughout the project can be discussed.

The majority of the soils in Suitability Class I are located along the south shore of the reservoir below Panhandle Peninsula and along the Nutbush Creek arm. Class I soils are also found along Buffalo Creek. An area of predominantly Class II soils extends down from the lands surrounding Grassy Creek, across the Panhandle Peninsula, and throughout most project lands surrounding Butcher's Creek. Soils ranked in Suitability Class III are located within the floodplains of the Dan and

Roanoke Rivers, in the upper reaches of Grassy Creek, and the upper reaches of Nutbush Creek. These areas are generally limited by frequent flooding. Project lands surrounding Eastland Creek are also designated as Class III. The distribution of soil suitability classes for intensive recreation is illustrated on Plates 2-06 and 2-07.

2-09 VEGETATION

A. General. The Environmental Inventory and Analysis that was prepared as a supporting document to this master plan included a detailed study of the vegetation at John H. Kerr Reservoir. The detailed study included working file maps at a scale of 1" = 1000' (33 sheet set), and narratives relating to vegetation cover types, degraded areas, rare habitats or conditions, areas of high and low productivity, and forest stand size and canopy closure classifications. A brief summary of the results of the referenced detailed study is provided below.

B. Cover Types. The John H. Kerr project supports a number of vegetation types that are typical throughout the Piedmont Region of Virginia and North Carolina. Eight major vegetation cover types have been identified on project lands as a result of this study. Detailed mapping of these types (1" = 1000' scale) is included in the working file; generalized mapping (1" = 8000') appears as Plates 2-08 and 2-09 of the mapping portfolio. For the purposes of the generalized mapping, Open Areas and Old Fields have been combined, as have Birch/Willow and Mesic Cove stands.

The appropriate acreage and percentage of project lands covered by each of the eight cover types (plus the degraded classification) are shown in Table 2-08. Brief descriptions of each cover type are provided below.

1. Upland Hardwood. Upland Hardwood is the most extensive cover type found on project lands, representing the climax forest type for the region. The association is dominated by oak and hickory, along with a few pine, but more than twenty species of trees and shrubs have been identified in these upland hardwoods stands. Upland hardwood stands have a high potential for intensive recreation use, high visual quality and the forest floor is tolerant of use.

2. Pine. Pines are the first trees to become established in secondary succession and can maintain this dominance for up to 100 years. The major pine species found at the project include loblolly, shortleaf, and Virginia pine. Loblolly pine occupy the best sites, Virginia pine the poorest, and shortleaf pine the intermediate sites. Pine stands offer aesthetic and functional benefits to recreation

TABLE 2-08

APPROXIMATE ACREAGE AND PERCENTAGE OF PROJECT LANDS IN
NINE VEGETATION CLASSIFICATIONS, JOHN H. KERR RESERVOIR

VEGETATION TYPE	NUMBER OF ACRES	PERCENTAGE OF PROJECT AREA
Upland Hardwood	17,674	31.7
Pine	6,858	12.3
Mixed Woodland	15,500	27.8
Bottomland Hardwood:		
Floodplain or "True" Bottomland	5,241	9.4
Transitional Bottomland	2,509	4.5
Birch/Willow	1,171	2.1
Mesic Cove Hardwood	502	0.9
Old Field	1,059	1.9
Open Land	4,572	8.2
Degraded	668	1.2
TOTAL*	55,754	100%

*Includes all fee owned lands above elevation 300 ft. m.s.l. Does not include 10,509 acres of easement lands.

Source: Environmental Inventory and Analysis, Appendix G to the Master Plan. 1980

development but the forest floor beneath them is intolerant of trampling. Site design must be sensitive to these factors.

3. Mixed Woodland. Mixed Woodlands contain between 31% and 69% of both pines and hardwoods. Mixed woodlands generally occur for two reasons, either as an intermediate stage of succession or as a result of selective timber cutting. In either case, they will normally mature into the climax oak-hickory forest. Mixed woodlands have high potential for recreation development because they offer the advantages of both the upland hardwood and pine cover types.

4. Bottomland Hardwood. Two distinct forest types are identified as Bottomland Hardwood. The first type (true bottomland) is found along the floodplains of the Dan and Roanoke Rivers. Soils in these stands are generally deep and quite productive and are susceptible to periodic flooding. Birch are commonly found in a narrow strip lining the banks, willow occupy the wettest sites, and the rest of these stands are dominated by ash, elm, and red maple. The second bottomland situation (transitional) occurs in low wet areas along some of the tributaries of the reservoir. These areas have been influenced by the impoundment of the reservoir and are in a transitional stage from upland hardwood or mesic cove species to more water tolerant bottomland species.

5. Birch/Willow. Birch/Willow stands are found along low lying water edges and on wet sites where flooding is frequent. They are generally established on sites which are too poorly drained to support most bottomland hardwood species. They offer no potential for recreation development.

6. Mesic Cove Hardwood. A rather unique community of mesophytic plant species are located in many of the small coves created by the reservoir. The moderate climate of these sites is well suited to beech and southern sugar maple. These species, along with various species of oak, dominate these cove sites. Because these sites are generally quite small, the portfolio maps do not reflect the number and distribution of Mesic Cove stands on the project.

7. Old Field. The Old Field cover type occurs where open land has been abandoned to revert to the natural successional pattern. Without management to maintain the old field habitat, these areas will quickly revert to forest cover. These areas are attractive for development because site preparation costs are low. However, they are also quite valuable for wildlife habitat and the two values must be balanced.

8. Open Land. Included in the Open Land category are all lands with less than ten percent canopy closure that are not classified as Old Fields. These areas include agricultural lands, lawn areas, and open areas associated with recreation use. The vegetation of these areas generally consists of mown grass or row crops. Trees and shrubs are often maintained for aesthetic or functional purposes within these areas.

C. Degraded Areas. Degraded areas (as shown on the 1" = 1000' working file maps) are those areas where the natural composition of the vegetative community has been sufficiently disturbed to necessitate the re-establishment of a new community. The factors that have created the degraded areas at John H. Kerr Reservoir are beaver dams, fluctuating water levels, and bark beetle infestation. These factors are discussed in detail in Appendix G, the Environmental Inventory and Analysis.

Beaver dams do not appear to be numerous in the area, but there are a few sites on the Banister River where their construction has caused considerable damage. It should be noted that beaver dams are considered as degraded areas because of their effects on vegetation. However, a limited number of these areas may be considered as a valuable resource due to the unique aquatic habitat they create.

Mapping for this study does not indicate areas degraded by water level fluctuations. In most cases this situation occurs as a narrow

band along the shoreline and cannot be mapped at the working file or the portfolio scale. It is recommended that this problem be more fully addressed in the Forest Management Appendix to this master plan and that further research and experimentation be conducted to determine the best management techniques for this zone.

By far the greatest destruction of forest stands has been done by the Southern Pine Beetle (Dendroctonus frontalis). Evidence of pine beetle infestation can be found around the entire perimeter of the reservoir. However, the greatest destruction has occurred above the confluence of the Roanoke and Dan Rivers. In these areas high levels of bark beetle damage was sustained for four consecutive years from 1973 to 1976 damaging hundreds of acres of forested land.

D. Vegetation Productivity. The Environmental Inventory and Analysis for John H. Kerr Reservoir rated all project lands in terms of vegetation productivity. For the purposes of that analysis vegetation productivity was defined as the relative capacity of a site to produce vigorous forest stands. Soil and aspect characteristics were utilized to determine productivity ratings for all project lands. Both factors were given equal weight in assigning productivity ratings. (Aspect maps are on file as part of the working file maps in the Wilmington District Office.)

Knowing the potentials and limitations of various land areas (in terms of productivity) is helpful in assisting planners and resource managers in making various land use decisions. For example, consideration should be given to locating major recreation areas in areas that are relatively productive to insure that the impacts of recreational use are minimized as a result of the natural resiliency of the site. Highly productive sites should also be favored for the implementation of intensive forest management techniques to insure a maximum return on associated investments. It is also important to identify sites that are characterized by very low productivity so that these areas may be managed with sensitivity, recognizing their lower capacity to withstand impacts.

The Environmental Inventory and Analysis provides a detailed discussion of the distribution of productive areas throughout the project. This paragraph only presents a broad overview. The flood plain regions of most rivers and streams, because of the accumulation of productive soils, tend to be highly productive. The steeper slopes are likely to be less productive due to the erosive effects of water and the drying influence of direct sunlight. Steeper southwest banks have an aspect advantage, enjoying a cooler, moister climate than do the northeast shores. The south bank of the lower main body extending to Nutbush Creek is a highly productive area for vegetation. Its flat topography and excellent position on the reservoir give this area a high potential for multi-purpose use.

E. Unique Conditions, Rare or Endangered Species. Based on a search of available literature, experience of current project and district staff, and significant field sampling associated with this study, no rare or endangered plant species have been identified at John H. Kerr. In the context of the Piedmont Plateau physiographic region no unique species, species assemblages, or other unique vegetational characteristics have been noted in the literature reviewed for this study.

The most unique vegetation features at the project include isolated mature stands (primarily white oak and pine), old field areas, and mesic cove stands. It should be noted that these mature stands are typically less than 5 acres in size, and therefore were not mapped during this study. Specific stands should be field checked to locate and protect desirable mature species prior to implementing any silvicultural prescriptions.

Due to the relative scarcity of mesic cove stands and old fields, these areas should be protected. In the case of cove stands, protection through conservation is sufficient to maintain the resource. However, maintenance and/or development of additional old field habitat will require continual management efforts. Granting of agricultural leases, prescribed burning, and mechanical cutting represent the best techniques for maintaining a proper balance between forested and old field areas. As a general rule, between 5 and 10% of the project area should be maintained in various early stages of succession. These open areas should normally be limited to less than 5 acres. The shape of the openings should maximize beneficial edge habitat.

2-10 AVIFAUNA

A. General. The Environmental Inventory and Analysis (Appendix G to the master plan) included a study of the avifauna of the project area. The study included a literature review, compilation of reliable field observations, and quarterly field studies.

B. Field Studies. Nine transects were established on project lands. Counts were made along these transects in the autumn, winter, spring and summer seasons of 1979. During transect counts, attempts were made to count all birds and convert the data to birds/hour of census. An index of diversity was used as an indication of the richness and stability of all habitats censused.

One permanent study plot was established within each of the seven terrestrial habitat types considered (open lands were not surveyed). These 10 acre plots were located and constructed in October and November of 1978, and censuses were conducted in four seasons paralleling the transect counts. The location of each transect

and study plot is illustrated on the working file and the portfolio maps (Plates 2-10 and 2-11).

C. Results. A working list of the potential or known bird species at John H. Kerr Reservoir was prepared. This working list included 255 species. Of this number, 143 were directly observed during the field studies, 45 have been sited in the area based on published literature and 46 others were noted in the area by reliable observers during work that has not been published. All literature review and field work data has been included in the Environmental Inventory and Analysis. Major conclusions associated with this study are summarized below.

1. Waterfowl Concentration. Autumn and winter concentrations on John Kerr Reservoir seem to be quite low in comparison with other piedmont impoundments. This may be due to disturbance by boat traffic, the extreme draw-down of the reservoir, or to the southern location of the reservoir.

2. Warbler Migration. Warbler migration through this area appears to be quite heavy at times. The volume and diversity of migrants during times when weather/wind patterns were favorable was impressive, despite limited sampling.

3. Endangered Species. Four federally designated endangered species occur or potentially occur on the project, Peregrine Falcon (Falco peregrinus), Bald Eagle (Haliaeetus leucocephalus), Kirtland's Warbler (Dendroica kirtlandii), and Redcockaded Woodpecker (Picoides borealis). Of these, Kirtland's Warbler and Bald Eagle have been sighted in the area. Thirty Blue-list species (48% of total list) are known to occur in the area.

4. Habitat Quality. Based on the avifauna study it was found that the birch/willow and old field cover types offered the highest value as bird habitat. Bottomland hardwood, mixed woodland, mesic cove hardwood, and upland hardwood were assigned a medium value. The pine cover type was the only habitat to show low habitat value.

2-11 HERPETOFAUNA

A. General. A survey of the herpetofauna (amphibians and reptiles) of the project area was included in the Environmental Inventory and Analysis, Appendix G to the master plan. The study was designed to determine the presence and relative abundance of all species of amphibians and reptiles on the project. The study included detailed literature searches, contacts with herpetologists who have worked in the area, museum searches, and a reconnaissance level field survey.

B. Field Survey. The field survey for this study was conducted from February through June, 1979. Eighteen transects were located which bisected representative samples of each terrestrial habitat. The habitats included seven of the eight cover types from the vegetation study (open areas were not included) plus the reservoir and associated streams. Searches were also conducted in less uniform habitats such as streams, temporary ponds, beaver ponds and the lake edge. Each transect was sampled six times from late winter through summer. The location of each transect is shown on the working file maps and Plates 2-10 and 2-11 of the map portfolio.

C. Results. A working list of 64 species for the project area was compiled. Of these, the presence of 41 species of amphibians and reptiles has been established by collection or direct observation. Existing museum specimens indicate the possible existence of another 23 species. None of the species listed or collected are currently designated as endangered or threatened on federal or state lists.

The Environmental Inventory and Analysis contains the results of the literature search and field studies. This study also includes short summaries of the natural history of each species on the working list.

The single most important habitat for herpetofauna based on specimen collections is mesic cove hardwood. The most species and greatest number of individuals were collected in this habitat. This is largely due to the cool, moist nature of mesic cove areas. The second most important habitat is old field. The remaining habitats in order of descending importance are upland hardwood, mixed woodland, birch/willow, bottomland hardwood, and pine forest. The reservoir and associated streams habitat was found to be relatively poor (in terms of herpetofauna) in comparison with other such bodies of water. It is suggested that this may be due to extensive variations in the pool level.

2-12 MAMMALS

A. General. The Environmental Inventory and Analysis (Appendix G to the master plan) included a study of the mammal populations at John H. Kerr Reservoir. Major data sources that were used in the study included museum and literature searches, contacts with local biologists, and considerable field survey efforts.

B. Field Surveys. The field survey effort began with a thorough reconnaissance of the project area to select representative sampling areas. Based on this reconnaissance seven mammal censusing plots, four transects, and eight spot trapping sites were selected. The location of each of these sampling areas is shown on the working

file maps and on the Wildlife Habitat Quality Map (Plates 2-10 and 2-11) in the map portfolio. Trapping periods were conducted during mid-December 1978, and during mid-May, 1979. Each plot was sampled for three nights and two days in each of the two trapping periods. It should be noted that the mammal grids were contained within the larger bird study plots.

C. Results. A working list of the mammals that are likely to occur in the greater project area included 51 species. The relatively rich fauna includes seven different mammalian orders and 16 families. The animals sighted plus the 877 animals collected during this study included 18 species and nine families. None of the species identified are currently designated as endangered or threatened on federal or state lists. The appendices to the environmental inventory include the lists of all species collected, brief life history accounts of all species on the working list, and a variety of other data.

The study noted that fluctuating pool levels at the project have a detrimental effect on some mammal species such as the muskrat as a result of reduced shrub and grass populations and flooding of burrows and nests. It was also noted that the variable land use pattern surrounding the project is conducive to maintaining a diverse mammal population. The study concluded that the old field cover type (as defined in the vegetation study) represented high value mammal habitat. The birch/willow, bottomland hardwood, mesic cove hardwood, and upland hardwood cover types were assigned medium quality ratings. Low quality ratings were assigned to the mixed woodland and pine cover types.

2-13 WILDLIFE HABITAT

A. General. Based on the results of the vegetation, avifauna, herpetofauna, and mammal studies as described above, all project lands were evaluated in terms of their relative wildlife habitat quality. This analysis was primarily based on the habitat value of the eight vegetation cover types but also considered habitat diversity, edge effects, interspersions, location in relation to the reservoir, and size of land parcels. The habitat value of each cover type for avifauna, mammals, herpetofauna, and an overall value are presented in Table 2-09 below. Evaluations of all project lands for wildlife habitat quality are shown on Plates 2-10 and 2-11.

B. Management Recommendations for Cover Types. It should be noted that the wildlife studies were based on observations of the wildlife in the area. As such, the wildlife and other aspects of the sampled habitat areas were used as general indicators of the total quality of the habitat. It is also important to note that most of the habitat types at the project are changing regularly as a result of

TABLE 2-09
WILDLIFE HABITAT VALUE OF SEVEN VEGETATION TYPES;
JOHN H. KERR RESERVOIR

Cover Type	<i>Herpetofauna</i>	<i>Avifauna</i>	<i>Mammifera</i>	<i>Overall Value</i>
Birch/Willow	M	H	M	M+
Bottomland Hardwood	L	M	L	M
Mesic Cove Hardwood	H	M	M	M+
Upland Hardwood	M	M	M	M*
Mixed Woodland	M	H	M	M
Pine	L	L	L	L*
Old Field	H	H	H	H

L - Low

M - Medium

H - High

(+) or (-) Indicates the relative position within the H, M, L ranking.

*Indicates that value should increase one level if the stand is mature.

natural succession or some type of man-made disturbance. Therefore, the value of a given parcel for wildlife should not be viewed as a static resource feature.

General recommendations for the management of each vegetation type for wildlife and recreation (as described in the Environmental Inventory and Analysis) are summarized below.

1. Birch/Willow. Although this area is ranked as medium, the habitat is regarded as one that should be disturbed as little as possible. The ecotone around such habitat is critical for the survival of some wildlife species living in birch/willow areas. The habitat does not lend itself to nature interpretation, recreation, or

most other uses. Because of its rarity on the project area, fluctuation of water levels within the habitat and moderately rich fauna, the habitat should be avoided in further efforts to develop facilities on the reservoir.

2. Bottomland Hardwoods. Bottomland stands, because of their frequent inundation, will be difficult to manage or utilize extensively. Extensive cutting or removal of vegetation would not be advised because of increased run-off and silt loads from the river systems to the reservoir. Although the impact of bottomland modification would have a moderate effect upon wildlife, recovery of these stands is relatively slow. The value of these areas for nature interpretation is relatively low because of the difficulties in constructing and maintaining trails and the abundance of noxious plants such as nettle and poison ivy.

3. Mesic Cove Hardwood. Mesic cove hardwood stands often exist in narrow bands along minor tributaries on upland slopes. Because of this a considerable number of small stands may not be shown on the maps prepared during this study. It is recommended that specific searches be made within any mixed or upland stands that may be scheduled for modification in order that cove areas might be located. Mature, well-developed stands and litter and soil layers should generally be protected. Siltation of creeks caused by careless construction/development practices would be severely detrimental to a variety of species, particularly rare elements of the herpetofauna. Development of interpretive nature trails would be an acceptable practice within cove stands since these areas are characterized by a comfortable microclimate and diverse plant and wildlife populations.

4. Upland Hardwood. Due to the broad range of upland hardwood stand and site conditions, the management of this habitat is dependent upon the specific conditions in each stand. Large, mature upland hardwoods are highly desirable and difficult to replace, while immature stands are of less value. Opening up parts of the canopy in successional upland forest may actually contribute to increased diversity of bird species but deer and squirrel populations may decline. Therefore, sound management of extensive upland stands should include a comprehensive examination of all habitats within a particular unit of the project. Stands should be managed to ensure that all habitats are represented in a variety of ages. While upland ecotones are not extremely important (except for those leading into old field), it would also be important to maintain connections between all major stands in the area to allow the dispersal or movement of larger forms from site to site.

Upland hardwood stands offer the greatest potential for recreation development. These areas are comfortable during the summer recreation season, provide a high level of visual quality throughout the year, and

have a forest floor that is quite tolerant of use. In addition, these upland sites offer dramatic views of the reservoir.

5. Mixed Woodland. Recommendations for this habitat are very similar to those given above for upland hardwood stands. Immature stands regenerate readily after a major disturbance. Therefore, young-growth mixed woodland stands represent ideal sites for modification with the least long-term effect. Long-term management practices on the reservoir should include a reduction in the amount of this habitat with the concomitant increase in old field areas. When considering year round recreational developments special attention should be given to mixed stands. While offering many of the advantages of an upland hardwood forest (visual interest, development tolerance) mixed stands offer better protection from winter climates because of the significant percentage of pine.

6. Pine. The planting of large amounts of pine is not recommended as a practice to encourage wildlife. Small bands of pine separating other habitats may be of moderate benefit in providing food and shelter for a few special forms, but the general ecological monotony and successional nature of pine stands limits their value to wildlife.

In general, pure pine stands should be avoided when locating major recreational developments. Although they offer some unique aesthetic characteristics, such as the pine fragrance and a strong visual edge, the forest floor is intolerant of use and quite susceptible to soil compaction.

7. Old Field. It is suggested that additional old field habitat be created. Old field is relatively rare on the project area, but it represents the most valuable habitat for game and non-game species. In the project area cutting and/or burning could be useful in managing old fields. Burning has proven to be a particularly valuable management tool in many parts of the country in maintaining and/or modifying areas of early successional vegetation types. If burning is used to create or maintain openings the spring and early summer seasons should be avoided since most vertebrates on the project reproduce at this time. Controlled burning should be conducted in late autumn or early winter when population densities are low, many forms have taken refuge deep in the soil, and many migratory forms are gone.

Old fields are attractive for recreation development because of reduced site preparation costs. However, because of their high wildlife value they should be avoided for development where possible. When utilized, it is recommended that equal field habitat should be created to replace the lost habitat.

8. Open Areas. It is difficult to evaluate this habitat because it contains such a variety of potential physical forms. Obviously, lawns provide habitat for relatively few species. Extensive open lawn areas are usable by a few transient forms, but few breeding species will be present. As shrubs, small trees or other complexity is added to the site, the system becomes more valuable to terrestrial vertebrates and will be occupied by more species. In fact, an open area with scattered trees and shrubs can be an area of maximum diversity for breeding birds. Whenever possible, open areas should be given a high resource rating if they possess developing vegetation and/or special structural characteristics (creeks, physiographic relief, well-developed ecotonal margins).

C. Other Areas of High Quality Wildlife Habitat. In addition to vegetation type, a number of other factors contribute to the creation of high quality habitat. Areas having high quality wildlife habitat value on the basis of these other factors (as discussed below) are shown on the Wildlife Habitat Quality Map (Plates 2-10 and 2-11).

1. Buggs Island. This area is considered as valuable habitat because it is wet and covered with mature upland hardwood tree species. It is potentially valuable for bald eagle, heron, and cormorant.

2. Keats Peninsula. This area is rated high because of the interspersed of upland, mixed, pine forests and open areas.

3. Ivy Hill and Panhandle Peninsula. These areas are valuable for wildlife habitat because they are large, undeveloped, and contain a variety of cover types. Both areas are recommended for intensive wildlife management.

4. Dan River and Banister River. These floodplains are rated high for wildlife because of their size, isolation, and interspersed of vegetation types.

5. Bluestone Park. This area is identified because of the expanse of upland hardwoods which will increase in habitat value with age.

2-14 AQUATIC RESOURCES

A. General. Aquatic resources of the reservoir and its tributaries were studied as part of the Environmental Inventory and Analysis. The study included both reservoir resources (fisheries, water quality, productivity, phytoplankton, zooplankton, and macrobenthos) and stream resources (fish collections and water quality). The reservoir and its tributaries were rated for aquatic habitat quality. These ratings appear

on the Aquatic Habitat Classification and Evaluation Map (Plates 2-12 and 2-13).

B. Reservoir Resources. John H. Kerr Reservoir supports an abundant fishery of game, non-game, and forage species. The most significant species are largemouth bass (Micropterus salmoides), striped bass (Morone saxatilis), crappie (Pomoxis sp.), bluegill, (Lepomis macrochirus), and gizzard shad (Dorosoma cepedianum). Bluegill and gizzard shad provide forage for the bass. The water quality of the reservoir provides good habitat for fresh water fishes with the exception of a section of the Nutbush Creek arm. The area above the Route 1308 bridge is under the influence of discharges from a sewage treatment plant. This area is rated low for habitat quality.

C. Stream Resources. Fifteen tributaries were sampled to obtain quantitative data on stream resources. Based on six criteria (diversity, rarity, water quality, reproductive value, evenness, and habitat type) these tributaries were classified as high, medium, or low for habitat quality. Seven tributaries rated high, five medium, and three rated low. The Dan and Roanoke Rivers were also classified as high because of their importance to the striped bass fishery. These habitat classifications are shown on Plates 2-12 and 2-13.

2-15 VISUAL CHARACTERISTICS

A. General. Visual quality in the landscape is a resource that must be recognized and planned for in the same manner as the other resources discussed in this chapter. The quality of the visual experience is a significant factor in the user's overall perception of an area.

Landscape visual quality is generally determined by two components, landscape character and unique or outstanding features. Landscape character is the general visual impression given by an area and is determined by elements of landform (relief, topographic complexity, enclosure) and surface characteristics (tree cover, water, land use). Unique or outstanding visual features include such features as water falls, unique landforms, vistas, and man-made features. No detailed visual study was undertaken as part of the master planning process, but there are several observations that can be made related to distinct areas or features on the project. These observations are useful in making recommendations for managing the visual resources of project lands.

B. Landscape Character. The following paragraphs describe the general visual character of distinct sections of the project.

1. Bluestone Park/Panhandle Peninsula. These two areas are characterized by steep slopes and complex topography. They feature

dramatic views of the reservoir from hillsides and ridgetops. These areas have high visual quality which should be protected. Site design in these areas should minimize environmental impacts, while taking advantage of the scenic attributes.

2. Roanoke River/Dan River. These areas are characterized by broad floodplains which are enclosed by steep hillsides. Both areas provide linear corridors for boating but development along the floodplain is not recommended. The Dan River flows through the City of South Boston, the major urban center at the project.

3. Hyco River. The Hyco River provides a long, enclosed corridor which is ideal for canoeing. The topography is not visually dramatic but dense vegetation along the river provides a strong sense of enclosure.

4. Main Body of Reservoir. The main body of John H. Kerr Reservoir can be divided into two distinct visual units. From the Panhandle to the confluence of the Dan and Roanoke Rivers the reservoir has a regular, linear shoreline, enclosed by steep banks. This area resembles a broad river. The area between the Panhandle and John H. Kerr Dam is characterized by vast expanses of open water, and gradual slopes that extend to the lakeshore.

5. Tributaries. A number of tributaries around the reservoir form inlets with significant bodies of water. Included among these are Bluestone Creek, Butcher's Creek, Eastland Creek, Mill Creek, and Grassy Creek. Each of these inlets can be considered distinct visual units. The shorelines are complex and they are enclosed by moderately steep slopes.

6. Nutbush Creek. The Nutbush Creek arm of the reservoir has a complex shoreline and is enclosed by low hills. The northern half of the arm is a wide lake with numerous peninsulas while the southern half is much narrower.

C. Visual Features. The dominant visual feature of the reservoir is the large expanse of water and the view to the opposite shoreline. Development should be sited so as to minimize the impact on views from the opposite shore. The second dominant feature is John H. Kerr Dam. Views to the dam should be emphasized to dramatize its importance to the project. Opportunities to view the reservoir from the surrounding road network are rare. Where these opportunities occur they can be significant visual features if roadside vegetation is managed to keep the views open.

CHAPTER 3

CULTURAL RESOURCE ANALYSIS

3-01 INTRODUCTION

Man-made features, conditions, and policies have a profound impact upon the operation, management, and future operations of John H. Kerr Reservoir. Due to their importance, man-made, or cultural, resources are examined in this chapter. Where appropriate, the data is discussed in terms of how a particular feature affects the operation, management, and development of John H. Kerr Reservoir.

3-02 PROJECT OPERATIONAL STRUCTURES

The major operational structure at John H. Kerr Reservoir is the main dam. The concrete dam is a gravity structure, 2,785 feet long, with a maximum height above streambed of 134 feet. The concrete dam is flanked on both banks by earth wing and saddle dikes having a combined length of 19,500 feet and a maximum height of 45 feet. Spillway discharges are regulated by 22 radian crest gates, each 42 feet long and 32 feet high. Water can also be released through six gated sluices, which are located near the bottom of the spillway monoliths.

Located at the toe of the dam on the left bank is the powerhouse. The initial and ultimate power-generating facilities in the powerhouse consist of six units rated at 32,000 kilowatts, and one unit rated at 12,000 kilowatts, or a total of 204,000 kilowatts. Transformers, located on a deck between the powerhouse and the dam, and a switchyard on the left bank immediately below the powerhouse, provide for transmission of energy away from the project at 115 kilowatts.

A second major dam is located at the project on Island Creek. The Island Creek dam and pumping station was constructed to permit continued tungsten mining operations in the valley of Island Creek after impoundment. The dam has a length of 2,100 feet and a maximum height of 95 feet. The level of the Island Creek pool is maintained below the level of John H. Kerr Reservoir through the use of three pumps. Additional information concerning John H. Kerr Dam and other operational structures at the project can be found in Design Memorandum No. 1B, The Master Plan for John H. Kerr Dam and Reservoir.

3-03 RESERVOIR REGULATION PLAN

A. General. John H. Kerr Reservoir is regulated primarily for purposes of flood control and hydroelectric generation. In

addition, reservoir operation is conducted for recreation, mosquito control, and downstream pollution abatement. At the top of the flood control pool (elevation 320 feet mean sea level), the reservoir has an area of approximately 83,000 acres and a storage capacity of 2,808,000 acre-feet. Of the flood control pool level storage, 1,278,000 acre-feet are reserved for the control of floods, 962,000 acre-feet are for power drawdown storage, and 568,000 acre-feet are for dead storage. The maximum surcharge elevation is 326 feet mean sea level. Table 3-01 summarizes the relationship between pool elevation and storage capacity. Figure 3-01 graphically illustrates this information through the use of area and volume curves.

TABLE 3-01
POOL ELEVATIONS, RESERVOIR AREA, AND STORAGE CAPACITY
JOHN H. KERR RESERVOIR

POOL	ELEVATION (m.s.l.)	RESERVOIR AREA (Acres)	STORAGE CAPACITY (Acre - feet)
Maximum Surcharge Pool	326	95,500	-
Flood Control Pool	320	83,200	1,278,000
Power Pool	300	48,900	962,000
Conservation Pool (Dead Storage)	268	22,200	568,000

B. Reservoir Operation. In order to serve its authorized purposes, the reservoir is operated in accordance with its rule curve, as is illustrated in Figure 3-02. During the summer the water is maintained near the top of the power pool (elevation 300' m.s.l.). This pool elevation is ideal for recreation and provides a high head for power generation. During the fall of the year there is a gradual drawdown which supplements the normally low flows, improves downstream water quality, and provides additional reservoir storage space to store extreme floods. The pool is maintained at a low level during December through February. In March the elevation of the reservoir is gradually filled to the top of the power pool. Filling during this normally wet season prevents damaging flows downstream, reduces mosquito problems by preventing shoreline plant growth, and stores water needed to supplement the normally low flows which occur later in the year. In April the reservoir is filled to an elevation of 302 feet m.s.l. and by early June the reservoir is lowered to the summer pool level.

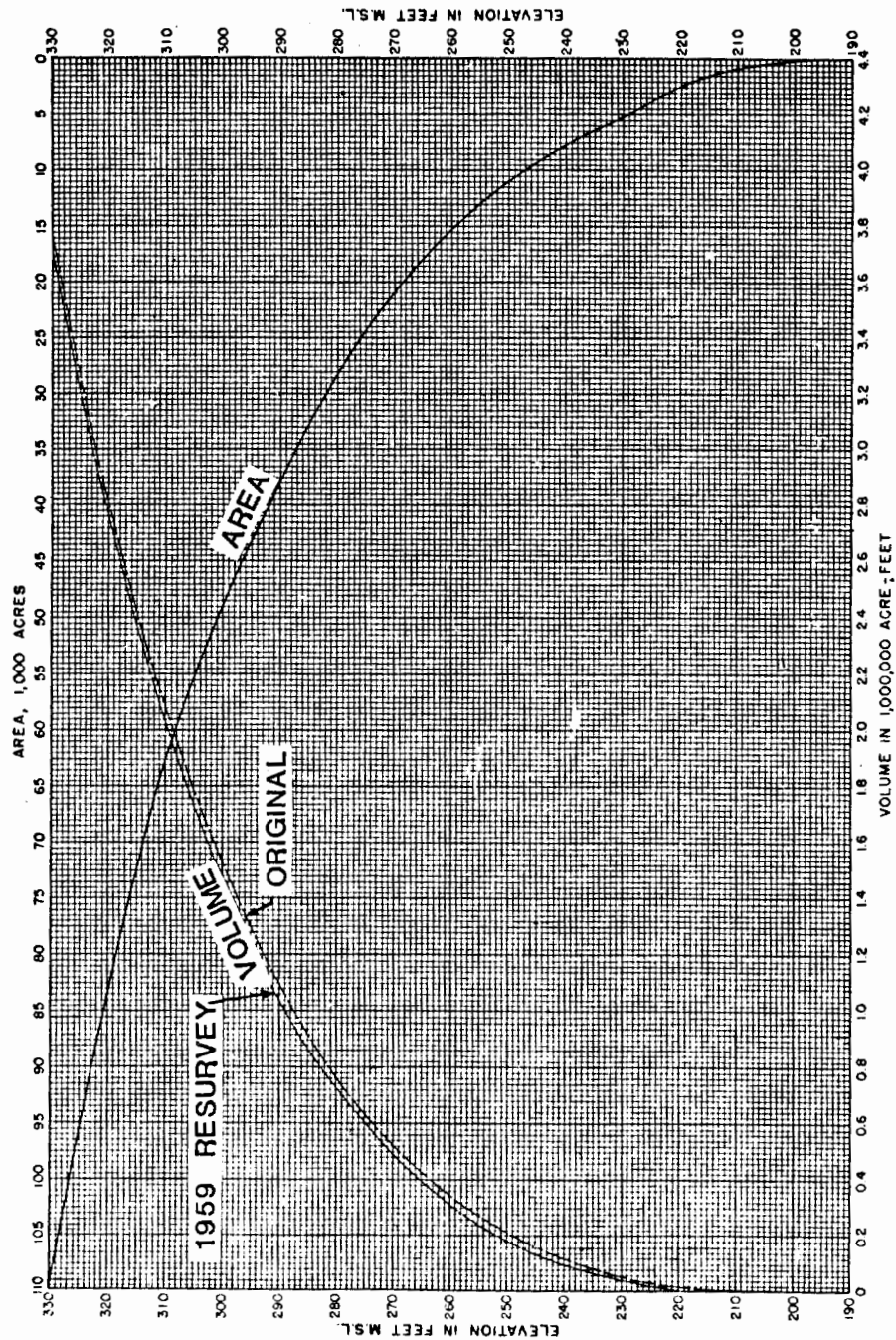


FIGURE 3-01
RESERVOIR AREA AND VOLUMES:
JOHN H. KERR DAM AND RESERVOIR

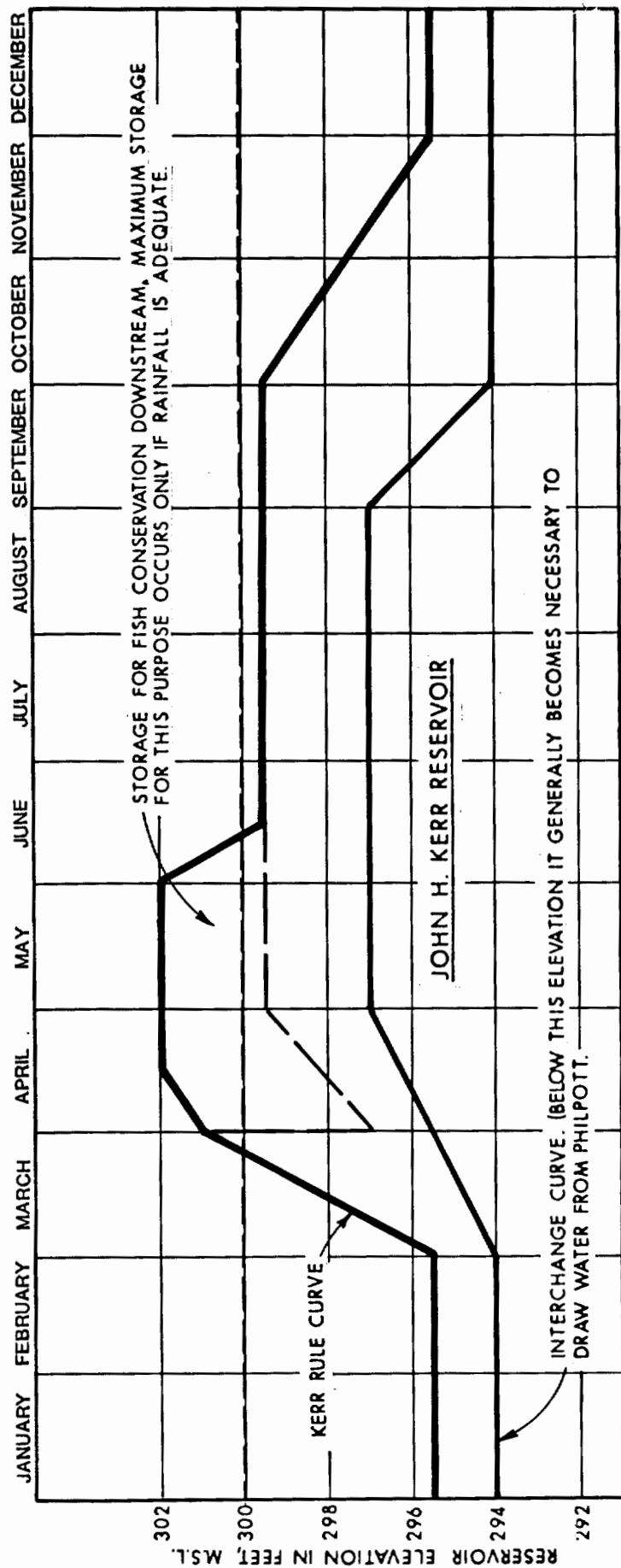


FIGURE 3-02
RESERVOIR RULE CURVE
JOHN H. KERR DAM AND RESERVOIR

While this rule curve can be followed during most years and does provide conditions nearly ideal for the many purposes which the project must serve, there are times when inflows into the reservoir are such that the rule curve cannot be followed. In times of floods, the reservoir level must rise above the rule curve if damaging flows downstream are to be prevented. In extreme floods, the reservoir will rise to elevation 320. In periods of drought, the reservoir must be drawn below rule curve in order to meet power commitments and to provide flows downstream for water quality control. In extreme droughts and barring severe electrical power shortages, the reservoir will be drawn to near 293. Severe power shortages could cause a further lowering of reservoir levels to around the mid-280's.

While the reservoir will reach these extremes only on rare occasions, it will depart from the rule curve to a lesser degree at more frequent intervals as the inflow varies from normal. Extreme fluctuations since operation at Kerr began in 1952 are as follows:

<u>Low</u>		<u>High</u>	
February 1956	280.2*	April 1975	318.9
December 1963	281.9*	May 1978	318.8

*Under the present plan of operation, this elevation would be no lower than 293.

Although Kerr is operated for many purposes, flood control and power benefits bear the burden of paying out the project costs, with power paying out 70 percent of these costs. To be of value to power customers, some energy must be generated in all years, dry as well as wet. However, it is only in very dry years and during power shortage emergencies that power generation has an adverse effect on other project purposes. A full description of reservoir operations at John H. Kerr Reservoir may be found in the Reservoir Regulation Manual, Appendix A to the Roanoke River Basin Reservoir Regulations Manual.

C. Effects of Reservoir Operations on Recreation. A rise or fall in the pool elevation at John H. Kerr Reservoir has some effect on the lands surrounding the reservoir, recreational facilities, and project visitation. A rise to flood control pool would render some recreational facilities (such as swimming beaches and boat launching ramps) temporarily unusable. Floating facilities such as docks and marinas may also be adversely affected. Other effects associated with high water levels include the accumulation of driftwood, the degradation of surrounding vegetation, and shoreline erosion.

A significant lowering of the pool elevation, caused by power production or drought, exposes aesthetically displeasing banks and

creates a significant boating hazard resulting from increased shallow water areas. Boat launching ramps and swimming beaches may become unusable during drawdown periods.

Exhibit A to the Master Plan Update includes criteria that are intended to insure that recreational facilities will be located and designed so that negative impacts due to required pool fluctuations will be minimized. Figure 3-03 illustrates the relationship between pool levels and the location of recreational facilities. For example: HCRS Category Type II and III facilities are generally located below the five-year frequency pool of 310 feet m.s.l. Should the pool rise above this elevation, these facilities would no longer be usable.

3-04 KERR RESERVOIR MARKET AREA

The market area of John H. Kerr Reservoir extends approximately 75 miles in all directions from the project boundaries. The market area, which provides the majority of project visitation, includes 20 counties in North Carolina, 13 counties in Virginia, and portions of 3 additional Virginia counties. Included in the market area is a major portion of the rapidly growing North Carolina "Piedmont Crescent," which includes the cities of Raleigh, Durham, Burlington, Greensboro, and High Point. Although they lie outside of the 75-mile boundary, the city of Winston-Salem and Forsyth County are included in the market area due to the high visitation originating from the area. The Kerr Reservoir market area is illustrated on Plate 2-01, the Project Location Map.

3-05 SOCIO-ECONOMIC PROFILE

The population of the market area has enjoyed an overall steady rate of growth in past decades, and this growth is expected to continue. Many of the rural counties have suffered declining population rates, but these declines have been offset by the rapid growth of the urbanized piedmont crescent of North Carolina. Table 3-02 illustrates population trends in the Kerr Reservoir market area.

Median family income in market area counties is significantly lower than in the nation as a whole. Some rural counties exhibit median family incomes which are approximately half of the national average while the more urbanized counties, such as those in the North Carolina Piedmont crescent, exhibit income levels approaching or exceeding the national average of \$9,590 (1970).

Unemployment has not been a significant problem in the market area as a whole. Unemployment in the market area ranges from a low of 1.8 percent in Campbell County, Virginia, to a high of 6.2 percent

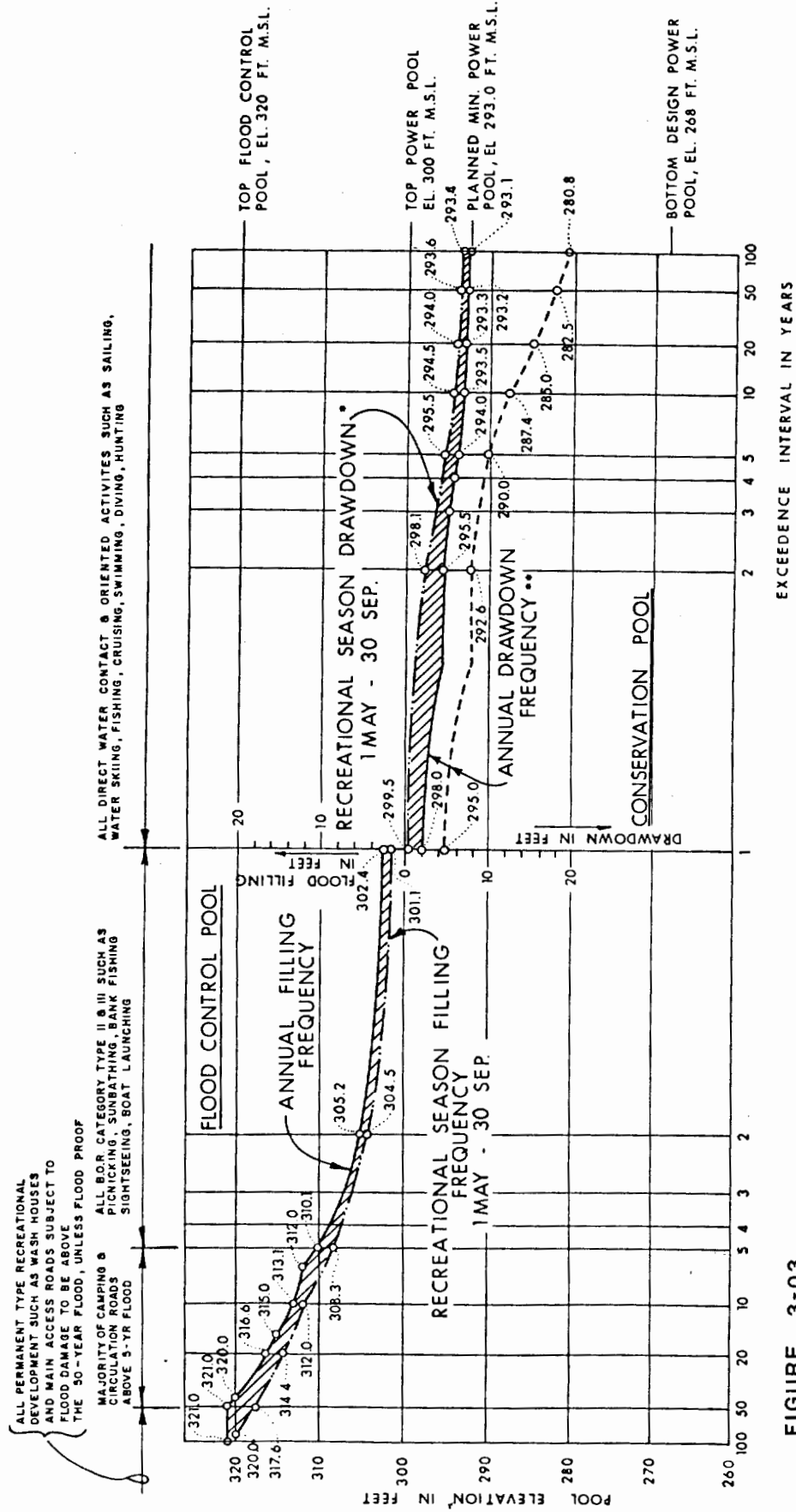


FIGURE 3-03
CORRELATION BETWEEN DEVELOPMENT CRITERIA
AND THE ESTIMATED RESERVOIR HYDROLOGY

- * RECREATIONAL SEASON DRAWDOWN FREQUENCY - 1 MAY - 30 SEPT.
- OPERATION WITH NORMAL POWER GENERATION
- ** ANNUAL DRAWDOWN FREQUENCY. OPERATION WITH NORMAL POWER GENERATION
- ANNUAL DRAWDOWN FREQUENCY. OPERATION WITH POWER EMERGENCY
- SIMILAR TO ONE IN 1974.

in the City of South Boston. Generally, unemployment has been less of a problem in the more urbanized counties than in the rural counties. Employment in the counties adjacent to the reservoir and within 50 miles of the reservoir is diversified. Important industries in the immediate area include textiles, manufacturing, forest products and agriculture.

The changing social and economic character of the market area will have effects upon recreation use at John H. Kerr Reservoir. Increased incomes and shorter work hours result in more time available for recreational pursuits. Although no drastic changes will occur, the improved economic condition of the area adjacent to the reservoir will result in increased attendance from the adjacent counties in relation to visitation from other portions of the market area. This increased local visitation will probably increase demands upon day-use facilities. Should fuel shortages become more frequent, the trend toward day-use visitation will be strengthened.

TABLE 3-02
POPULATION OF THE
JOHN H. KERR RESERVOIR MARKET AREA

CITY AND COUNTY GROUPINGS	1960	1970	PERCENT CHANGE
Counties Adjacent to Kerr Reservoir	169,171	160,020	-5.4%
Counties and Cities Within 50 Miles			
North Carolina	545,877	657,752	15
Virginia	277,488	283,768	2.3
Counties and Cities Within 50 - 75 Miles			
North Carolina	792,914	873,645	10.2
Virginia	225,880	236,988	4.9
TOTAL	2,011,330	2,212,173	10

3-06 SURROUNDING LAND USE

As is shown on Plates 3-01 and 3-02, forests and agriculture are the major surrounding land uses at John H. Kerr Reservoir. Around the eastern portion of the project, agriculture predominates; while in the western portions, forests predominate. Major concentrations of commercial activities occur at the Town of Clarksville, the City of South Boston, the City of Henderson, and to a lesser extent, the Town of Boydton. In addition, isolated commercial structures can be found on the roads leading to the project. Industrial land uses are concentrated in two major areas, the City of South Boston and an area southeast of Clarksville. A textile plant southeast of Clarksville and adjacent to Sunrise Landing is the only major industry adjoining project lands.

In view of its potential impact upon the management of the project and the recreational use of the project by the public, residential land uses surrounding project lands are highly significant. Permanent residential areas are located at the previously mentioned urban centers, along rural roadsides, and subdivisions. Heavy concentrations of subdivisions are found along the Nutbush Creek arm of the reservoir, on the southern shore of the reservoir between Clarksville and Grassy Creek, and in the vicinity of the Cuscowilla Peninsula on the northern shore of the reservoir.

Subdivision developments along project boundaries can have serious effects upon the project and its use by the public. Subdivision development can serve to hinder public access to the reservoir, increase the costs of right-of-way purchase, and be the source of encroachment onto public lands. In addition, adjacent residential development can result in demands placed on the Corps of Engineers for facilities intended to serve residents of these residential areas rather than the general public.

In the future, residential development can be expected to increase in the area surrounding Kerr Reservoir. Careful monitoring by the Corps of Engineers of adjacent land uses is necessary to prevent encroachments and to protect the environmental integrity of the reservoir.

3-07 EXISTING UTILITIES

Electric service to the John H. Kerr Reservoir area is supplied by four firms: Virginia Electric and Power Company, Carolina Power and Light Company, the Mecklenburg Electric Cooperative, and the Piedmont Electric Cooperative. Electric service is available to virtually all portions of the project through existing distribution lines or lines which are on adjacent lands.

Water service is available at Clarksville and South Boston. In addition, the Henderson Water Authority operates a water intake and treatment plant on Nutbush Creek. Although at this time water service is not available from the water authority to the immediate reservoir area, service may become available in the future. Electric utility lines in the Kerr Reservoir area are shown on the Cultural Influences Map, Plates 3-05 and 3-06.

3-08 ARCHAEOLOGICAL AND HISTORICAL RESOURCES

In order to assure maximum consideration of archaeological and historical resources in the preparation of this Master Plan Update for John H. Kerr Dam and Reservoir, a major archaeological survey was conducted during the early phases of the master planning process.¹ This survey includes detailed accounts of the project area's prehistory and history. No attempt will be made to duplicate these accounts in this document. However, it is appropriate to describe several features that were incorporated into the Archaeological Survey to assist the master planning team in conceptual planning for future recreation areas, and in the establishment of a project-wide interpretive plan.

The archaeological survey consisted of the visual inspection of approximately 5,904 acres of existing parks and recreation areas, and approximately 220 miles of shoreline adjacent to both existing and proposed recreation areas. Survey teams recorded both historic and prehistoric sites, with the result that practically the entire span of human occupation of the area was documented. The survey resulted in the discovery and recording of 217 archaeological sites and 62 isolated finds in Virginia and 108 archaeological sites and 46 isolated finds in North Carolina. Only two of the sites in Virginia, and fifteen of those in North Carolina had previously been recorded.

Based upon the survey of the John H. Kerr Reservoir, it is apparent that both existing and proposed recreation areas contain a variety of historic and prehistoric sites. While most of the prehistoric sites along the shoreline have been largely destroyed by wave action and by collectors, sites located in inland areas are usually less heavily damaged.

For the purposes of the Master Plan Update, the major aspect of the Archaeological Survey was the development of a model to predict the probability of finding archaeological sites within existing and proposed recreation areas. This procedure ranked areas that are likely

¹Garrow, Patrick, H., Max E. White, and E. Michael Watson. Archaeological Survey of the John H. Kerr Reservoir, Virginia-North Carolina. Soil Systems, Incorporated, 1980.

to produce archaeological sites into categories of greater or lesser numerical density. It should be noted that density, as it is used in this model, refers to the presence of cultural activity areas (sites) on a numerical basis, rather than in the basis of artifactual or occupational intensity. The probability density rankings were combined for historic and prehistoric sites. Major criteria utilized in the application of the model included slope, aspect, proximity of pre-dam water and stream confluences, historic road network, and other sites located in the respective areas.

The results of the site probability model are presented on Plates 3-07 and 3-08. These maps illustrate areas of high, medium, and low site probability density, archaeologically sensitive areas within existing recreation areas, areas recommended for nomination to the National Register of Historic Places, and areas recommended for nomination as National Register Districts.

Although certain regions of the proposed recreation areas have been designated as zones of low archaeological site probability density, these designations do not eliminate the possibility of sites actually occurring in those zones. It is recommended that should any construction be planned or scheduled for areas with high probability density ratings, an archaeological survey be conducted of the areas in question before construction is begun so that the cultural resources of the area might be more completely assessed.

In regard to the sites recorded by the survey, most of those along the shoreline have already been destroyed and no further work has been recommended. However, in instances where sites do exist fairly intact, it is strongly recommended that they be preserved. In cases where the sites are located in or near heavily used public parks and recreation areas, appropriate steps should be taken to preserve the integrity of the site. For the important historic site at Satterwhite Point Park, immediate salvage is recommended. For others, park or Corps personnel should maintain surveillance to ensure that erosion or vandalism does not further endanger each site.

3-09 ACCESSIBILITY

John H. Kerr Reservoir is served by a well developed network of interstate, federal, state, and county highways. The major transportation routes to the area are Interstate Highway 85, U.S. Highway 58, and U.S. Highway 15. Interstate Highway 85, provides general access from cities to the north and south of the project including the Raleigh-Durham area to the south and the Richmond-Petersburg area to the north. U.S. Highway 15 crosses the reservoir at Clarksville, providing access to the central portion of the project. U.S. Highway 58 also crosses the reservoir at Clarksville, providing east-west

access to the reservoir and linking the South Boston and Clarksville areas. These major, project-wide access routes are shown on Plate 2-01, the Project Location Map.

Access to recreation areas is provided by a network of state and county roads. The condition of these roads varies, but most are adequate to handle recreational traffic. Project access roads are shown on Plates 3-05 and 3-06, the Cultural Influences Map.

The location and condition of access routes plays an important role in the development of project resources. Heavy concentrations of recreation facilities have been developed along Nutbush Creek, which is the arm of the reservoir closest to the major project-wide access route, Interstate Highway 85. With the proposed widening and upgrading of U.S. 58 north of the project, increased demand for recreation facilities can be anticipated on the northern shore of the reservoir.

The location and condition of transportation routes has also had, and will continue to have, a definite effect on growth in the project area which could impact the reservoir. Because of their location in respect to highway and rail transportation, Clarksville and South Boston can be expected to continue to be the focus of industrial, commercial, and residential growth in the area. Growth in these areas can also be expected to increase the demand for recreational facilities.

Several access problems exist at the project. There are numerous tracts of project land which suffer from inadequate access, including several potential recreation areas. The John H. Kerr Reservoir Resource Manager has identified at least 76 parcels which suffer from access problems; 7 of these are within proposed recreation areas. Parcels experiencing access problems are identified on Plates 3-05 and 3-06, the Cultural Influences Map. Access to all areas of the project is needed to assure public use of project lands, for boundary maintenance, forest management, and fire control. Because of the frequency of access problems it is recommended that a separate study be conducted for the identification, analysis, and resolution of the public's access to the lakeshore where private facilities such as boat docks have been permitted.

3-10 INDUSTRIAL USE OF PROJECT LANDS

Project resources are used for industrial purposes in some selected cases. Burlington Mills operates a water intake for its plant near Clarksville and discharges treated effluent into the reservoir. Neither the withdrawal of water or discharge of treated effluent has any appreciable effect upon the reservoir or the

public's use and enjoyment of the reservoir. Noise associated with the operation of the plant can detract from public use of certain project lands. However, the extent of noise degradation is generally limited. Water is also withdrawn by the Henderson Water Authority for use in a regional water system. Many of the Authority's customers are industries in Henderson. Effluent discharged by the Nutbush Creek sewage treatment plant has also added to the nutrient loading of the reservoir. However, with the upgrading of the plant, this problem should be diminished.

Mineral extraction activities have not been allowed on project lands in the past. While not on project lands, a tungsten mine is located upstream of the Island Creek Dam and the Island Creek Reservoir is operated to prevent the flooding of this now inactive mine. Should market conditions allow, the tungsten mine could be reopened.

Intensive forest cutting is not practiced on project lands. Selective thinning is undertaken in order to improve forest stand quality and prevent pine beetle infestations. Trees harvested for these purposes are utilized by local industries.

3-11 APPLICATION OF PUBLIC LAWS

EP 1165-2-1 lists all laws pertinent to Corps of Engineer civil works projects. The laws most pertinent to the operation and management of John H. Kerr Reservoir are discussed below:

A. Public Law 78-534, Flood Control Act of 1944. Section 4 of the Flood Control Act of 1944, as amended in 1946, 1959, and 1962, authorized the U.S. Army Corps of Engineers to construct, maintain, and operate public parks and recreational facilities in reservoir areas under their jurisdiction and to grant leases and licenses for project lands to other public agencies.

B. Public Law 85-624, Fish and Wildlife Coordination Act of 1954. The Fish and Wildlife Coordination Act of 1954, as amended in 1958, provides that fish and wildlife conservation shall receive equal consideration with other project purposes and that such consideration be included in other aspects of water resource development programs. Fish and wildlife conservation and enhancement programs may be developed under a 75% Federal and 25% State cost sharing agreement.

C. Public Law 86-717 of 1960. (An Act to provide for the protection of forest cover for reservoir areas under the jurisdiction of the Secretary of the Army and the Chief Engineer). This Act requires that, where practicable, timber resource management should be carried out on Corps reservoir lands to increase the value of forest areas for conservation, recreation, and other beneficial uses.

D. Public Law 89-72, Federal Water Project Recreation Act of 1965. The Federal Water Project Recreation Act of 1965 requires that a local non-federal governmental entity must pay at least 50 percent of recreation facility development costs on separate recreation lands and 100% of all operation, maintenance, and replacement costs for the facilities under a contract with the Department of the Army. Following construction, the public recreation area and facilities are leased for a period of fifty years to the local governmental entity for operation and management. Current policy at Kerr is based on PL 89-72 although the project does not strictly fall under the provisions of the law and it has not controlled most development to date.

E. Public Law 89-669, Protection of Rare and Endangered Species Act. This Act states the policy of Congress that the Secretaries of the Interior, Agriculture, and Defense shall seek to protect species of native fish and wildlife, including migratory birds, that are threatened with extinction and, insofar as is practicable and consistent with the primary purposes of these agencies, shall preserve the habitats of such threatened species on lands under their jurisdiction.

F. Public Law 91-190, National Environment Policy Act of 1969. This Act requires that an Environmental Impact Statement, assessing the impact of major proposed actions on the environmental quality of federally owned land, be prepared for all such proposed actions by the appropriate agency.

G. Public Law 91-611, River and Harbor and Flood Control Acts of 1970. Title II, Section 234 of this Act gives citation authority to designated Federal personnel for the purpose of citing visitors who commit violations of those rules adopted by the Secretary of the Army related to the protection of Corps of Engineers project resources.

H. Public Law 93-291, Preservation of Historic and Archaeologic Data Act of 1974. This Act permits the expenditure of up to one percent of the amount appropriated for a Civil Works project for the survey, recovery, analysis, and reporting of important (scientific, historical, archaeological, and paleontological) data which may be lost as the result of Civil Works under Corps jurisdiction, including non-Federal lands provided by local interests for certain types of projects. The authorities of Public Law 93-291 apply to operating projects, as well as those in the planning or design stages.

I. Public Law 93-303 of 1974. This Act provides that fair and equitable fees will be assessed the users of specialized sites, facilities, equipment or services provided at substantial Federal expense. That law is the authority for the user fees charged at family and group camping facilities at Corps managed areas. Such fees are primarily for the use of special services over and above the normal free use

by the public of the project's natural resources and should not be construed as entrance fees for the use of these resources.

J. Public Law 93-643, Highway Amendment of 1974. The Highway Amendment of 1974, allows the Department of Transportation to participate in the construction or reconstruction of access roads leading to public areas on Corps reservoirs.

K. Public Law 92-75, Federal Boat Safety Act of 1971. The Federal Safety Act of 1971, authorized Federal agencies to establish boat safety regulations for areas within their jurisdiction, or to accept as a supplement to Federal regulations, a Boating Safety Program which is designed and enforced by appropriate State authorities. Guidelines are also established for development and funding of the State Programs. However, due to limited enforcement authority the boat safety regulations at John H. Kerr Reservoir will be those found in the North Carolina and Virginia State Statutes.

CHAPTER 4

RECREATION USE ANALYSIS

4-01 INTRODUCTION

This chapter focuses on a variety of interrelated factors that effect the type and amount of recreational use at John H. Kerr Reservoir. The chapter begins by summarizing the existing recreational facilities at the project; and major competing recreation areas within the Kerr Reservoir market area. The chapter then identifies the regional and on-site recreational demand. Finally, summarizing tables illustrate the existing and future need for additional facilities at the project. The chapter closes with a general discussion of marina needs, and the effect of periodic flooding upon the availability of existing facilities at the project.

It should be noted that the facility need calculations and other projections included in this chapter are often based on planning judgment and assumptions. Therefore, this data should be utilized as a general guideline for facility development. It is recognized that final design of each recreational area must also consider site resource capacities, budgetary constraints, goals of supporting agencies, operational capabilities, and numerous other planning considerations.

4-02 SUMMARY OF EXISTING RECREATION AREAS AT JOHN H. KERR

At this time (February, 1980) there are forty-five existing recreation areas within the project boundaries at John H. Kerr Reservoir. The Corps of Engineers operates 15 recreation areas at the reservoir. These recreation areas offer facilities for camping, picnicking, boating, swimming and other recreational pursuits. The Commonwealth of Virginia is responsible for 3 recreation areas on federal lands. In addition, the Commonwealth of Virginia maintains a state park, Staunton River State Park, adjacent to federal lands. Since Staunton River State Park predates the reservoir and is not a water-oriented facility, it is not examined in this master plan. The State of North Carolina operates 9 recreation areas along the Nutbush Creek arm of the reservoir. Other recreational development includes 16 quasi-public areas under lease to various civic organizations and two marinas operated under lease arrangements. Table 4-01 summarizes the facilities within these existing recreation areas at John H. Kerr Reservoir. Each area will be examined in greater detail in Chapter 7, the Facility Development Plan. The location of all existing recreation areas is shown on Plate 4-01, the Site Location Map.

TABLE 4-01

SUMMARY OF MAJOR FACILITIES AT
EXISTING RECREATION AREAS
JOHN H. KERR DAM AND RESERVOIR

RECREATION AREA	Camp Unit	Group Unit	Picnic Unit	Launch Lane	Major Beach	Minor Beach	Boat Spaces	Stables	STATUS A=Active I=Inactive
<u>CORPS OF ENGINEERS:</u>									
Palmer Point	45*		21	2		1			A
Ivy Hill	25		17	2					A
Island Creek			9	2					A
Grassy Creek	11		24	2					A
Longwood	44		13	2					A
Buffalo Springs Wayside			6						A
Buffalo Public Use Area	15		17	2					A
Staunton View			8	2					A
Bluestone Landing			6	2					A
Rudds Creek	103		15	3		1			A
Eagle Point Landing				2					A
Eastland Creek	28		5	2					A
North Bend Park	265	1	89	5		6			A
Tailrace Access Area				1					A
Clarksville Overlook		N O F A C I L I T I E S							
Subtotal	536	1	230	29	0	8	0	0	-

*These camp units are no longer at the site but they can be utilized at a new site.

TABLE 4-01

SUMMARY OF MAJOR FACILITIES AT
EXISTING RECREATION AREAS
JOHN H. KERR DAM AND RESERVOIR

RECREATION AREA	Camp Unit	Group Unit	Picnic Unit	Launch Lane	Major Beach	Minor Beach	Boat Spaces	Stables	STATUS A=Active I=Inactive
<u>COMMONWEALTH OF VIRGINIA:</u>									
Occoneetchee State Park	150		18	3					A
Clover Landing				1					A
Hyco Landing				1					A
Subtotal	150	0	18	5	0	0	0	0	-
<u>STATE OF NORTH CAROLINA:</u>									
Kimball Point	98		9	1	1				A
County Line Park	85		14	2					A
Bullocksville Park	69		54	1					A
Satterwhite Point	159	1	52	5			174		A
Nutbush Creek	108		6	1					A
Williamsboro Wayside									A
Hibernia	150	1	97	4	1				A
Henderson Point	84		18	3					A
Townsville Landing	10		4	4			50		A
Subtotal	763	2	254	21	2	0	224	0	-

TABLE 4-01

SUMMARY OF MAJOR FACILITIES AT
EXISTING RECREATION AREAS
JOHN H. KERR DAM AND RESERVOIR

RECREATION AREA	Camp Unit	Group Unit	Picnic Unit	Launch Lane	Major Beach	Minor Beach	Boat Spaces	Stables	STATUS A=Active I=Inactive
<u>QUASI-PUBLIC AREAS:</u>									
Lakeside Camping ¹ and Sports Club	21		1						A
Methodist Board of Education	24	14	1	1					A
Pines of Carolina G.S.A.	4			1					A
N.C. State Univer- sity Faculty	4	3	1						A
Univ. of North Carolina	29	35	2		2				A
North State Boating Club		N O F A C I L I T I E S							I
Presbytery of Granville	38	2	1		3				A
Occoneetchee B.S.A.		N O F A C I L I T I E S							A
Tuscurora B.S.A.		1			1	1			A
Fort Bragg		1				1			I
Cherokee B.S.A.		1				1			A
State Line Baptist Assembly		1	1						A
VA. Tidewater Council G.S.A.		1	4						A
Lynchburg Y.M.C.A.		1	2	1			1		A

TABLE 4-01 (CONT'D)

SUMMARY OF MAJOR FACILITIES AT
EXISTING RECREATION AREAS
JOHN H. KERR DAM AND RESERVOIR

RECREATION AREA	Camp Unit	Group Unit	Picnic Unit	Launch Lane	Major Beach	Minor Beach	Boat Slips	Stables	STATUS A=Active I=Inactive
R. E. Lee B.S.A.	1	4			1				A
N.C. State University ²	NO FACILITIES								I
Subtotal	116	13	61	8	4	9	0	1	-
OTHER AREAS:									
Flemington Road Marina	75		10	2			67		A
Clarksville Marina				1			105		A
Subtotal	75	0	10	3	0	0	172	0	
Project Total	1640	16	573	66	6	17	396	1	

1. Lakeside Camping and Sport Club is actually a private club. Because it is the only private recreation lease at Kerr Reservoir it is discussed throughout the Master Plan Update with the Quasi-Public lease sites.
2. The lease for this area has been cancelled.

4-03 REGIONAL RECREATIONAL RESOURCES

Numerous major recreational resources lie within the Kerr Reservoir market area. Three state parks are located within the North Carolina portion of the market area (Eno River, William B. Umstead, and Medoc Mountain), and five state parks are located in the Virginia portion (Smith Mountain Lake, Staunton River, Occoneechee, Goodwin Lake-Prince Edward, and Holiday Lake). Two of the Virginia parks, Staunton River and Occoneechee, are adjacent to Kerr Reservoir. Several state forests are also located in the Virginia portion of the market area.

There are no publicly owned lakes comparable to Kerr Reservoir within the market area. Two Corps of Engineers operated lakes, B. Everett Jordan and Falls of the Neuse, are currently under construction in the Raleigh-Durham, North Carolina area, and are expected to provide recreational opportunities beginning in the 1980's. Several large lakes are owned and operated by private utility companies. These include Smith Mountain Lake, Hyco Lake, Lake Gaston, and Roanoke Rapids Lake. Public facilities on these lakes are generally limited, except in the case of Smith Mountain Lake, where the Commonwealth of Virginia operates a state park.

Other recreational resources within the market area include numerous local parks, and state and national historical sites dating from colonial times. The location and attraction of these recreational resources have been considered in the projection of project visitation (as discussed in Section 4-05), the analysis of resultant facility needs, and the planning of the facilities. The general location of these regional recreational areas are shown in Figure 4-01 and on Plate 2-01.

4-04 REGIONAL DEMAND FOR RECREATIONAL FACILITIES

The regional demand for outdoor recreation facilities within the John H. Kerr Dam and Reservoir market area was examined through the use of the Virginia Outdoors Plan, 1979, and the North Carolina State-wide Comprehensive Outdoor Recreation Plan (SCORP), 1979. Because facility and activity needs of the two states are not in a suitable form for direct comparison, the needs of the states were examined separately. Section 4-08 includes a discussion of conclusions associated with the regional demand included in this section, and site-specific demand as calculated in Section 4-05.

The John H. Kerr Reservoir market area (as discussed in Section 3-04) includes portions of five of the Commonwealth's recreation planning regions. However, since the largest single portion of Virginia visitation to the project originates from Region 11, only that region was examined in terms of facility needs.

Table 4-02 illustrates demand figures for Region 11 by activity days. The activity days are also ranked in descending numerical order, from the larger unmet demand to the smaller. The Virginia Outdoors Plan identifies bicycling, pool swimming, fishing, hiking/walking, and hunting (land) as the activities that have the largest unmet demand. Wherever possible, future recreational development at the project will help to meet these needs.

The John H. Kerr Reservoir market area completely encompasses two North Carolina SCORP planning regions and portions of two others. For purposes of assessing recreational need, SCORP Regions K and L

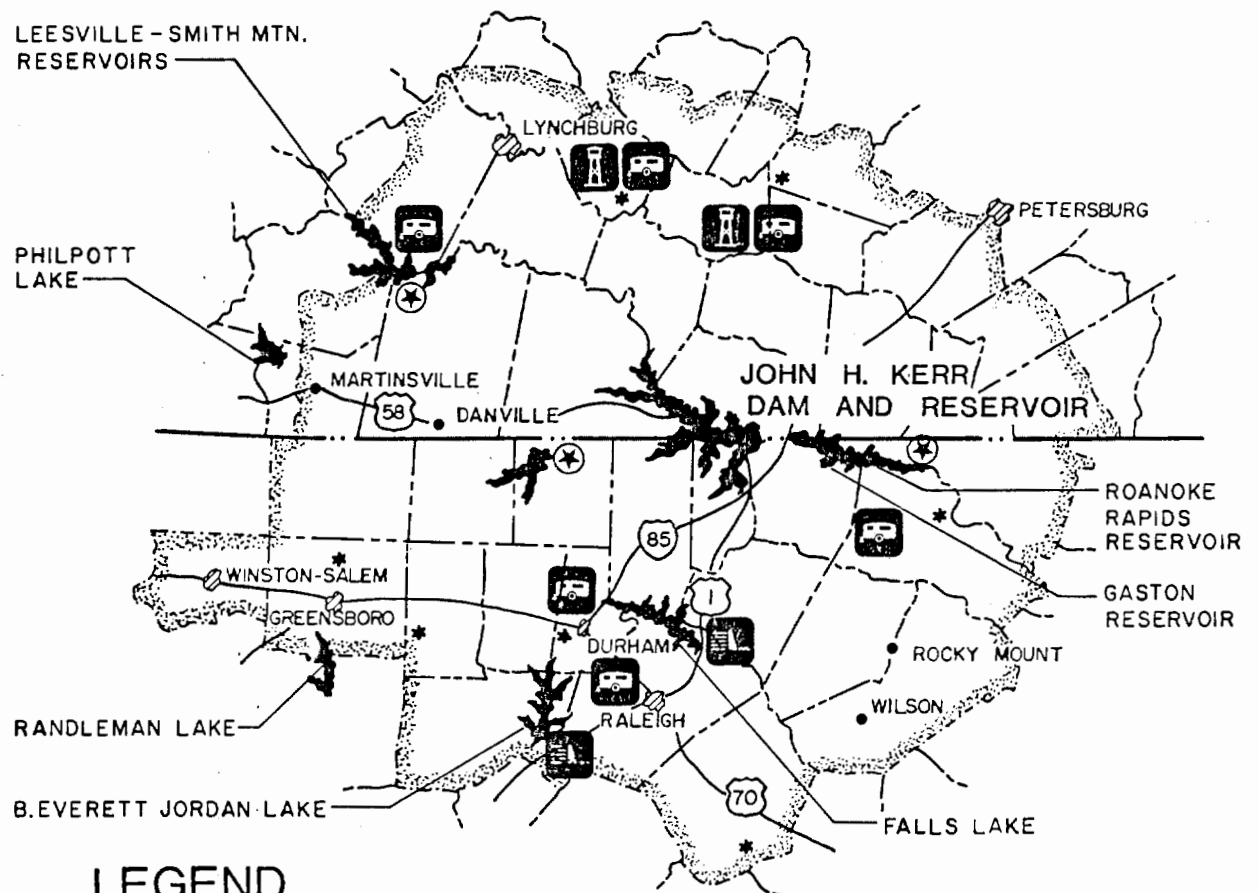


FIGURE 4-01

MAJOR RECREATIONAL RESOURCES OF
THE JOHN H. KERR DAM AND RESERVOIR MARKET AREA

TABLE 4-02
OUTDOOR RECREATION NEEDS IN ACTIVITY DAYS¹
VIRGINIA REGION 11

ACTIVITY	1977 ⁴	1990	1990	1990	2000	2000	2000
	SUPPLY	DEMAND	NEED ²	RANK ³	DEMAND	NEED ²	RANK ³
Bicycling	4,750	54,500	49,750	1	62,500	57,750	1
Pool Swimming	23,321	60,411	37,089	2	72,605	49,284	2
Fishing	16,427	43,699	27,272	3	45,384	28,957	3
Hiking/Walking	2,580	26,430	23,850	4	30,810	28,230	4
Hunting (Land)	7,535	11,427	3,893	5	11,519	3,984	5
Hunting (Waterfowl)	13	1,049	1,036	6	1,022	1,009	7
Picnicking	26,768	27,320	552	7	29,800	3,032	6
Off Road Vehicles	1,920	480	-1,440	8	480	-1,440	8
Camping	19,260	6,812	-12,448	9	8,024	-11,236	9
Beach Swimming	33,600	18,000	-15,600	10	17,400	-16,200	10

¹Source: Virginia Outdoors Plan, 1979.

²1990 or 2000 Demand minus 1979 Supply equals Facility Need in terms of Activity Days.

³The highest need is indicated for bicycling, with a need of 49,750 days. Surplus facilities (future demand exceeds current supply) are indicated for beach swimming, off road vehicles, and camping.

⁴The most recent supply figures referenced in the 1979 Virginia Outdoors Plan are for 1977.

were examined. The North Carolina SCORP identifies regional needs on the basis of acreage of various classes of recreation lands. The classes of outdoor recreation lands which are most applicable to the needs which could be provided at John H. Kerr Reservoir are as follows:

1. District Parks - intensively developed parks located in rural settings and designed to provide a variety of indoor and outdoor recreation opportunities to rural residents.
2. County Parks - extensively developed parks that are designed to serve the residents of several municipalities or a large rural area.

3. Specialized Outdoor Recreation Areas with low intensity use (SORA Low) such as zoos, golf course and boat access areas.
4. Specialized Outdoor Recreation Areas with medium intensity use (SORA Medium) such as flower gardens, arboretums, campgrounds, ski resorts, amusement and novelty resorts.
5. Specialized Outdoor Recreation Areas with high intensity use (SORA High) such as outdoor theatres, stadiums, agricultural fairs and sport centers.
6. III Specialized Outdoor Recreation Areas with low intensity use (III SORA Low) such as gamelands and agricultural land for hunting.
7. State Parks - outdoor recreation areas with emphasis on providing a quality natural environment within a one-hour drive of regional population centers. These areas are usually developed to an extent that only 5% to 10% of the surface area is for intensive human use with the remainder being maintained in a natural condition.
8. Destination Parks - large outdoor recreation areas that are remote from large urban centers of population and that provide a wide range of extensive outdoor recreation opportunities. The primary service area for such parks might include a region of the nation consisting of several states, or it may include the entire nation.

Table 4-03 lists the sum of the acreage needs by park type for North Carolina planning Regions K and L.

The North Carolina SCORP reveals a regional need for several classes of parkland which the John H. Kerr project is capable of providing. Only two classes of parkland are shown to be in surplus. These surplus parklands include "SORA Low", which include facilities such as zoos, golf courses and boat access areas; and III SORA Low, which include gamelands and agricultural lands for hunting.

4-05 PROJECTED VISITATION

A. Selection of Similar Project. Future visitation to John H. Kerr has been projected in accordance with ER 1120-2-403, "Procedures for Estimating Recreation Use," and Technical Report No. 2, "Estimating Initial Reservoir Recreation Use." In addition, adjustments were made to account for the special characteristics of the reservoir, its visitors, and the market area. The procedure for projecting

TABLE 4-03
COMBINED NEEDS: NORTH CAROLINA SCORP REGIONS K AND L

SUBCLASS	POPULATION	SUBCLASS STANDARD (acres per 1000 population)	1979		NET NEED
			GROSS NEED (acres)	PRESENT SUPPLY (acres)	
Neighborhood Emphasis ¹	135,033	2.5	338	225	161
Community Emphasis ³	135,033	2.5	338	302	107
City Park ³	135,033	5.0	676	289	414
District Park ³	260,167	2.5	651	50	603
County Park ³	395,200	10.0	3,952	1,352	3,020
SORA LOW ⁴	395,200	8.0	3,160	5,608	-2,448
SORA MED	395,200	20.0	7,904	5,023	2,881
SORA HIGH	395,200	2.0	792	156	636
III SORA LOW ⁴	395,200	150.0	59,280	69,016	-9,736
State Park	395,200	15.0	5,929	4,210	1,719
Destination Park	395,200	125.0	49,401	-	49,401
TOTAL				86,231	46,758

¹Source: North Carolina Statewide Comprehensive Outdoor Recreation Plan (SCORP), 1979.

²Population varies depending upon the "market area" associated with each type of park.

³Because of the local nature of these facilities, a surplus in one area does not balance a need in another area, therefore, Net Need may not be the difference between Gross Need and Present Supply.

⁴A negative Net Need indicates a current surplus of these park types in Regions K and L.

visitation consists of the computation of per capita use rates by comparing Kerr Reservoir to similar projects and applying these per capita use rates to market area population projections.

B. Determination of Per Capita Use Rates. Per capita use rates were computed on the basis of the most similar project in the Technical Report No. 2 listings: Hartwell Reservoir. The selection of the most similar project is based on various statistically weighted characteristics of the projects, including physical characteristics, population similarities, and competing projects. Since the weighted characteristics of Hartwell Lake turn out to be 1.22 where 1.00 would be perfect similarity, Hartwell's per capita rates were decreased by 22 percent and used for John H. Kerr Reservoir. In order to account for the influence that B. Everett Jordan Lake, Falls of Neuse Lake and Randleman Lake will have upon recreational use patterns when they become operational in the 1980's, it was assumed that the per capita use rates at John H. Kerr Reservoir would decrease by 50 percent as the other projects become operational. This assumption is based upon the belief that because of Kerr Reservoir's superior size, familiarity and established recreational clientele, it will continue to draw some visitors from areas that are closer to one of the new lakes. Table 4-04 presents per capita use rates for John H. Kerr Reservoir. Per capita use rates are shown for the population closer to John H. Kerr Reservoir than a competing project and for the population which will be closer to a competing project as they become operational.

C. Total Visitation Computations. The total day-use visitation within the 75-mile radius market area is represented by the sum of the population within each zone multiplied by the appropriate per capita use rate. Then an additional 15 percent is added for those day-users coming from outside the 75-mile radius. To arrive at total visitation, overnight or camping usage must then be added. This amounts to an additional 23 percent at John H. Kerr Reservoir.¹ Table 4-05 presents total projected visitation to John H. Kerr Reservoir through the year 2030. Historical visitation for the years 1952, 1960, 1970, and 1976 have also been included. As can be seen from the table, visitation to the reservoir is expected to experience a slight decline beginning in the 1980's due to the opening of new, competing projects. After the year 1990, visitation is expected to increase annually. Figure 4-02 graphically illustrates projected visitation to John H. Kerr Reservoir. Table 4-06 has been included to illustrate the projection methodology process as it was applied to calculate 1980 visitation.

¹Source: "1975 - 1976 Recreation Statistics," Department of the Army, Corps of Engineers, Civil Works Directorate, EP 1130-2-401, June 1978.

TABLE 4-04
PER CAPITA USE RATES FOR
JOHN H. KERR DAM AND RESERVOIR

ZONE (in miles)	CLOSER TO KERR RESERVOIR	CLOSER TO A COMPETING PROJECT
0 - 10	6.4	N/A
10 - 20	4.3	2.1
20 - 30	2.9	1.4
30 - 40	2.0	1.0
40 - 50	1.3	0.7
50 - 75 ¹	0.6	0.3

¹The 75-mile limit is exceeded in the case of Forsyth County, N.C., since records show that it is a significant source of visitation.

TABLE 4-05
HISTORICAL AND PROJECTED TOTAL ANNUAL
VISITATION TO JOHN H. KERR DAM AND RESERVOIR

YEAR	VISITATION
1952	345,000
1960	1,794,800
1970	3,007,100
1971	3,275,100
1972	3,800,300
1973	3,195,700
1974	3,276,700
1975	3,721,900
1976	3,856,000
1977	4,071,200
1978	3,950,000
1979	3,620,200
1980	3,995,000
1985	3,800,000
1990	3,604,000
2000	3,776,000
2010	3,929,000
2020	4,071,000
2030	4,315,000

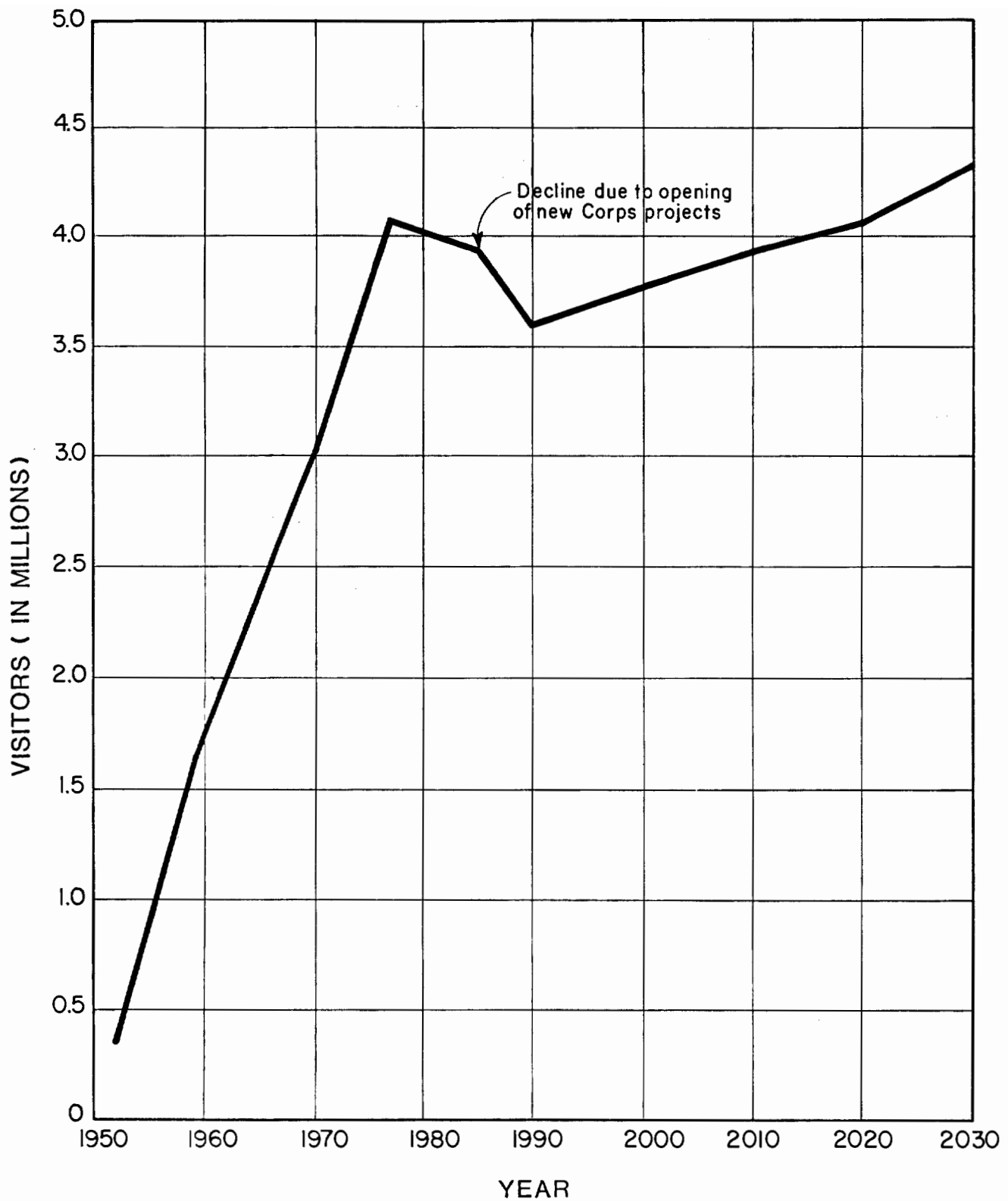


FIGURE 4-02
PROJECTED VISITATION TO
JOHN H. KERR DAM AND RESERVOIR

TABLE 4-06
1980 VISITATION PROJECTION
JOHN H. KERR RESERVOIR

ZONE	1980 Population NC	By VA	Zone TOTAL	Per Capita Use Rate	Day Use
0-10 mi.	56,800	34,900	91,700	6.4	586,880
10-20 mi.	35,600	31,600	67,200	4.3	288,960
20-30 mi.	55,100	27,800	82,900	2.9	240,410
30-40 mi.	141,400	37,700	179,100	2.0	358,200
40-50 mi.	493,800	101,000	594,800	1.3	773,240
50-75 mi. ¹	435,700	112,300	548,000	0.6	328,800
50-75 mi. ²	564,600	261,600	826,200	0.3	247,860

- TOTAL DAY USE VISITATION WITHIN 75 MILE RADIUS	2,824,350
- Plus 15% use from outside the 75 mile radius	423,650
- Plus 23% for overnight use (camping)	747,000
- TOTAL 1980 VISITATION	3,995,000

¹For the purpose of calculating 1980 visitation it was assumed that 548,000 people in the 50-75 mile zone would be closer to Kerr Reservoir than a newly opened competing lake. Therefore, a per capita use rate of 0.6 was applied as shown in Table 4-04.

²Similarly, it was calculated that 826,200 people would be closer to a competing project than they would be to Kerr Reservoir. Therefore, the reduced per capita rate of 0.3 was applied to account for the competing facilities. Competing facilities that were considered included Smith Mt. Lake, Falls Lake, Jordan Lake, and Randleman Lake.

4-06 DESIGN LOAD AND FACILITY NEEDS

A. Design Load. The design load (as referenced in this plan) may be defined as the projected visitation that will occur on an average weekend day during the peak recreation season. (This should not be confused with the "maximum," or "peak day" load that may occur on July 4th or Labor Day. The maximum load could be estimated at 25% more than the normal weekend day design load figures shown below.)

The formula for calculating the design load for John H. Kerr Reservoir is based on Technical Report No. 2 as shown below:

$$DL = \frac{D \times \%PS \times \%WE \times \%DS \times \%WS}{PD}$$

where:

- DL = Design Load (For an average weekend day during the peak season)
- D = Demand (Annual Attendance for the projected year to be calculated)
- %PS = Percent of Demand Occurring during the Peak Season: 1 May to 15 September (75%)¹
- %WE = Percent of Demand Occurring on Weekend Days and Holidays (75%)¹
- %DS = Percent of Day Use at Designated Sites (70%¹ of day-use visitation and 100%¹ of camping, boating, and fishing)
- %WS = Percent of Demand without Sightseers (78%)¹ & 2
- PD = Number of Peak Days (Weekends and Holidays) during the Peak Season

Notes:

1. All percentage figures shown above are based on visitation surveys at John H. Kerr Reservoir.
2. Sightseers have been eliminated from the calculation of design load since this type of visitor does not normally require construction of major facilities.

The formula is implemented for the years 1980, 1985, 1990, and 2030 as shown below (for day use activities).

1980

$$DL = \frac{3,995,000 \times .75 \times .75 \times .70 \times .78}{44} = 27,886 \text{ total visitors (excluding sightseers on an average weekend day)}$$

1985

$$DL = \frac{3,800,000 \times .75 \times .75 \times .70 \times .78}{44} = 26,524 \text{ total visitors (excluding sightseers on an average weekend day)}$$

1990

$$DL = \frac{3,604,000 \times .75 \times .75 \times .70 \times .78}{44} = 25,156 \text{ total visitors (excluding sightseers on an average weekend day)}$$

2030

$$DL = \frac{4,315,000 \times .75 \times .75 \times .70 \times .78}{44} = 30,119 \text{ total visitors (excluding sightseers on an average weekend day)}$$

B. Participation Rates. On the basis of historical records at John H. Kerr Reservoir, the percentage of total annual project visitation devoted to individual recreation activities has been established. In addition, the turnover rates and average group size for each individual recreation activity has also been established. Table 4-07 lists these participation rates, turnover rates, and average group sizes.

TABLE 4-07

PARTICIPATION RATES, TURNOVER RATES, AND AVERAGE GROUP SIZE;
JOHN H. KERR DAM AND RESERVOIR

ACTIVITY	PARTICIPATION RATE	TURNOVER RATE	AVERAGE GROUP SIZE
Pleasure Boating ¹	20	1.5	3 people/boat 40 launches/day
Camping	23	1.0	4 people/site
Fishing ²	33	1.5	2 people/boat
Picnicking	16	1.6	3.5 people/table
Swimming:	28		
Day Use		2.0	3 people/group
Camping		3.0	4 people/group
Sightseeing	22	4.0	
TOTAL	142% ³		

¹Includes pleasure boating and water skiing.

²Assume that 90% of all fishing occurs from boats and 10% from the shoreline.

³A total percentage greater than 100 indicates that visitors often engage in more than one activity while they are at the project.

C. Facility Needs. On the basis of the information presented in the preceding sections, the facility needs for John H. Kerr Reservoir were calculated. For most facilities, this is accomplished by multiplying design load (as calculated above) by the participation rate (Table 4-07) and dividing by the appropriate average group size and turnover rate. The process applied to calculate individual facilities required to meet 1980 visitation demands are shown below. This same methodology was applied to visitation projections for 1985, 1990, and 2030. Tables 4-08 and 4-09 summarize existing supply and future demand and need for recreational facilities at the reservoir.

1. PLEASURE BOATING - 1980:

Time: 1 May - 15 September = 44 weekend days

$$\frac{3,995,000 \times .75 \times .75 \times 1 \times .78}{44} = 39,837 \text{ total visitors (excluding sightseers)}$$

$$39,837 \times .20 \text{ (participation rate)} = 7,967 \text{ pleasure boaters}$$

To calculate the number of lanes required:

$$\begin{array}{r} 7,967 \div 3 \text{ (people/boat)} = 2,656 \text{ Pleasure boats} \\ - \quad 400^1 \text{ Boats at marinas} \\ \hline 2,256 \text{ Boats to be launched} \end{array}$$

$$2,256 \div 40 \text{ (launches/day/lane)} = 56 \text{ Lanes used by Pleasure boats}$$

$$\text{Lanes for fishing} = 37^2 \quad \frac{44 \text{ weekend day}}{82 \text{ total weekend day}} = 54\%$$

54% is for overlap for fishing vs. pleasure boating from 1 May through 15 September

$$\begin{array}{r} 37 \text{ lanes for fishing less } 54\% = 17 \text{ Fishing Lanes} \\ \quad 56 \text{ Pleasure Boat Lanes} \\ \hline 73 \text{ Total Lanes} \end{array}$$

$$2,256 \div 1.5 \text{ (turnover)} = 1,504 \text{ Pleasure Boat/Trailer Parking Spaces}$$

2. FISHING - 1980:

Time: 15 March - 15 December + Holidays = 82 weekend days

$$\frac{3,995,000 \times .75 \times .75 \times 1 \times .78}{82} = 21,376 \text{ total visitors (excluding sightseers)}$$

¹Assumed 450 boats in marinas in 1985, 475 in 1990, 500 in 2030.

²This calculation is shown in the following section.

$14,963 \times .33$ (participation rate) = 7,054 total fishermen

$.90 \times 4,938 = 6,349$ Boat Fishing

$.10 \times 4,938 = 705$ Bank Fishing

$6,349 \div 2$ (people/boat) $\div 1.5$ (turnover) = 2,116 Boat Fishing
Parking

$2,116 \div 40$ (launch/lane) = 53 lanes

$105 \div 3$ (people/car) $\div 1.5$ (turnover) = 157 Bank Fishing
Parking

3. SIGHTSEEING - 1980:

Time: 1 May - 15 September = 44 weekend days

$\frac{3,995,000 \times .75 \times .75 \times .70 \times .78}{44} = 27,886$ Total Visitors Without
Sightseers

$\frac{3,995,000 \times .75 \times .75 \times .70}{44} = 35,750$ Total Visitors With Sightseers

$35,751 - 27,886 = 7,865$ Sightseers

$7,865 \times .30$ (% people that facilities will be provided for) = 2,360
People

$2,360 \div 3$ (people/car) $\div 4$ (turnover) = 197 Parking Spaces

4. CAMPING - 1980:

Time: 1 May - 15 September plus Holidays = 44 Weekend Days

$\frac{3,995,000 \times .75 \times .75 \times 1 \times .78}{44} = 39,837$ Total Visitors
(without sightseers)

$39,837 \times .23$ (participation rate) = 9,162 Campers

Group Camping - 7%

$.07 \times 9,162 = 641$ Group Campers

$641 \div 30$ (average group size) = 21 groups

Family Camping - 93%

$8,521 \div 4$ (persons/site) = 2,130 Campsites

5. PICNICKING - 1980:

Time: 1 May - 1 October + 3 Holidays = 47 Weekend Days

$$\frac{3,995,000 \times .75 \times .75 \times .70 \times .78}{47} = 26,106 \text{ Total Visitors (excluding sightseers)}$$

$$26,106 \times .16 \text{ (participation rate)} = 4,177 \text{ picnickers}$$

$$4,177 \div 4 \text{ (person/table)} \div 1.6 \text{ (turnover)} = 653 \text{ Picnic Units}$$

$$653 \times .66 \text{ (\% table units)} = 431 \text{ Table Units}$$

$$653 - 431 = 222 \text{ Non-Table Units}$$

653 Parking Spaces

Total Needs for Picnicking:

4,177 people for toilet and water needs
653 parking spaces
431 table units
222 non-table units

6. SWIMMING - 1980:

Time: 1 June - 15 September + 3 Holidays = 33 Weekend Days

$$\frac{3,995,000 \times .75 \times .75 \times .70 \times .78}{33} = 37,181 \text{ Total Visitors (excluding sightseers)}$$

$$37,181 \times .28 = 10,411 \text{ Swimmers}$$

Campers: $.23 \times 10,411 = 2,394$ People
 $2,394 \div 4 \text{ (person/site)} \div 3 \text{ (turnover)} = 200 \text{ Parking Spaces}$

50% of campsite within walking distance
 $.50 \times 200 = 100 \text{ Parking Spaces}$

Day Use: $.77 \times 10,411 = 8,016$ People
 $8,016 \div 3 \div 2 = 1,336 \text{ Parking Spaces}$

Square Feet of Beach Needed:

$$\text{Campers: } 2,394 \div 3 \times 150 \text{ (sq. ft./person)} = 119,700 \text{ sq. ft.}$$

$$\text{Day Use: } 8,016 \div 2 \times 150 = 601,200 \text{ sq. ft.}$$

TABLE 4-08

EXISTING FACILITIES AND PROJECTED FACILITY DEMAND¹

JOHN H. KERR DAM AND RESERVOIR

Year	Picnic				Camping		Beaches				Boating		Fishing				Sight-seeing	
	Picnic Units (Table)	Picnic Parking Spaces	Non-Table Picnic Units	Non-Table Picnic Parking Spaces	Camp Units	Group Camps	Day-use Swimming (sq. ft.)	Day-Use Swimming Parking Spaces	Campground Swimming (sq. ft.)	Campground Swimming Parking Spaces	Pleasure Boating Launch Lanes	Pleasure Boating Parking Spaces	Boat Fishing Launch Lanes	Boat Fishing Parking Spaces	Total Launch Lanes Less Overlap	Bank Fishing Parking Spaces	Sightseers	Sightseeing Parking Spaces
Existing Dec 1978	573				1,640	16				0	44	1,470	22	1,118	66	80	7,778	0
1980	431	431	222	222	2,130	21	601,200	1,336	119,700	100	56	1,504	53	2,116	80	157	7,865	197
1985	408	408	210	210	2,026	20	571,875	1,271	113,900	95	52	1,384	50	2,013	75	149	7,482	187
1990	387	387	199	199	1,922	19	542,400	1,205	108,000	90	48	1,281	48	1,909	70	142	7,096	177
2030	463	463	239	239	2,301	23	649,350	1,443	129,300	108	59	1,579	57	2,286	85	169	8,495	212

¹Based on Corps of Engineers Technical Report No. 2 methodology.

TABLE 4-09
SUMMARY OF MAJOR FACILITY NEEDS
JOHN H. KERR DAM AND RESERVOIR

FACILITY TYPE	PICNIC UNITS ¹	CAMP ¹ UNITS	GROUP CAMPS	BOAT LAUNCH LANES	SWIMMING ² (Sq. Ft.)					
EXISTING (1978) SUPPLY ³	573	1,640	16	66	248,100 ⁴					
YEAR	DEMAND ⁵	NEED ⁶	DEMAND	NEED	DEMAND	NEED				
1980	653	80	2,130	490	21	5	80	14	720,900	472,800
1985 ⁷	618	45	2,026	386	20	4	75	9	685,775	437,675
1990	586	13	1,922	282	19	3	70	4	650,400	402,300
2030	702	129	2,301	661	23	7	85	19	778,650	530,550
ULTIMATE FACILITY NEEDS TO BE PLANNED FOR										
		129	661		7			19		530,550

¹As shown in the calculation of 1980 facility need and Table 4-08, it is assumed that up to 40% of the picnic unit needs may be met by "non-table" picnic units.

²Includes day use and camping area beaches.

³All existing supply figures include facilities at quasi-public areas.

⁴Field inventoried and estimated swimming beaches.

⁵Demand was calculated as shown in Section C above.

⁶Need is equal to Demand minus Existing (1978) Supply.

⁷The drop in facility needs that occurs between 1980 and 1985 is due to the development of several competing lakes.

4-07 MARINA FACILITY NEEDS

Based upon observations during several major field trips conducted during the master planning process, discussions with each of the current marina operators, and experience at similar Corps of Engineers reservoirs. There is a strong need for additional marina facilities at John H. Kerr Reservoir. There are currently five marinas in operation at the project. However, these operations generally offer a limited range of services and facilities.

It was noted that the level of use and demand experienced at each existing marina seems to be directly related to the quantity and quality of facilities and services that are currently offered. For example the Clarksville Marina, which offers a full range of services and excellent docking facilities, has a 2-3 year waiting list for boating slips. Other marinas that offer minimal accommodations have experienced very low demand and/or use.

Evidence of the potential demand for expanded public docking facilities is also substantiated by the large number of dry boat storage buildings that are located along many of the roads leading to the reservoir. It is reasonable to assume that if additional boat slips were available at the project a proportion of the boats currently stored at dry storage facilities would be berthed at marinas, and many of those boats which are currently trailored to the reservoir would also be berthed at the marinas. However, before any additional marinas are authorized a comprehensive project-wide marina market analysis would be completed. Marinas are also discussed in Chapter 11, Special Problems.

4-08 COMPARISON OF PROJECT AND REGIONAL RECREATIONAL NEEDS

A. General. Regional and project level recreation facility needs (as presented in Sections 4-04 and 4-06 respectively) have been determined by three governmental bodies: the Commonwealth of Virginia, the State of North Carolina, and the Corps of Engineers. In some cases there are conflicts between the needs indicated in the state-wide recreational plans and/or the facility needs established through the Corps' site specific methodology. In order to plan for the optimum use of public resources at the project, it is necessary that these conflicts be examined and resolved to the extent feasible with available data and methodology.

B. Comparison of Facility Needs. Facility needs as defined by the states and the Corps of Engineers are compared in this section for selected major recreational facilities. In all cases project needs as defined by the Corps of Engineers are for the ultimate (year 2030) need. Commonwealth of Virginia needs are based upon the last projected year (year 2000), and North Carolina needs are based upon the

latest, unpublished, SCORP information which does not predict future needs.

1. Picnicking. By the year 2000, a low to moderate need for picnicking units will exist in Virginia Region 11. North Carolina Regions K and L show a need for four classifications of parks which can contain picnicking facilities. In view of these state needs, the ultimate project need of an additional 129 picnic units is reasonable and is in agreement with state needs.

2. Camping. Camping is projected to be in surplus supply in Virginia by the year 2000. However, this surplus is decreasing and by the year 2030, it will be greatly lessened. North Carolina exhibits a moderate need for two classifications of parkland which can include camping facilities (SORA Medium and State Parks); and one park type which can include camping (Destination Park) is in great need. Figures for the project show a need for an additional 661 campsites to meet ultimate (2030) needs. Camping at Corps of Engineers projects is usually a recreational activity conducted in conjunction with water oriented activities such as fishing and boating. As will be shown in the following paragraph, the regional demand for boating and fishing is very strong. Due to camping's close association with water-oriented activities and the demand for compatible parkland types in North Carolina, the project's need for an additional 661 campsites is considered to be a reasonable planning guide.

3. Boat Launch Lanes. Neither the Virginia nor North Carolina SCORP considers boat launch lanes as a separate category. However, the Virginia Outdoors Plan indicates a very high demand and need for fishing facilities in the area, and fishing is largely dependent upon boat launching lanes to provide water access. The North Carolina SCORP indicates a surplus of SORA Low lands, which include launch lanes. A large number of launch lanes are located in the North Carolina portion of the project along the Nutbush Creek arm of the reservoir. Since these launch lanes serve North Carolina users and are concentrated in a small portion of the project, the projected need for 19 additional launch lanes is considered to be reasonable.

4. Swimming Beaches. The Virginia regional needs analysis indicates a large surplus of swimming beaches. However, a more detailed examination of this surplus reveals that less than 2 percent of the regional facility inventory is located in the 3 counties adjacent to the reservoir. The majority of the regional beach inventory is removed from the immediate reservoir area and does not serve reservoir users. It must also be recognized that the methodology employed to determine project beach needs only considers swimming at developed beaches. However, a significant portion of swimming at the reservoir occurs along undeveloped shoreline and from boats. Therefore, the need for developed beaches may not be as strong as the Corps of Engineers methodology indicates.

4-09 POOL FLUCTUATIONS AND FACILITY NEEDS

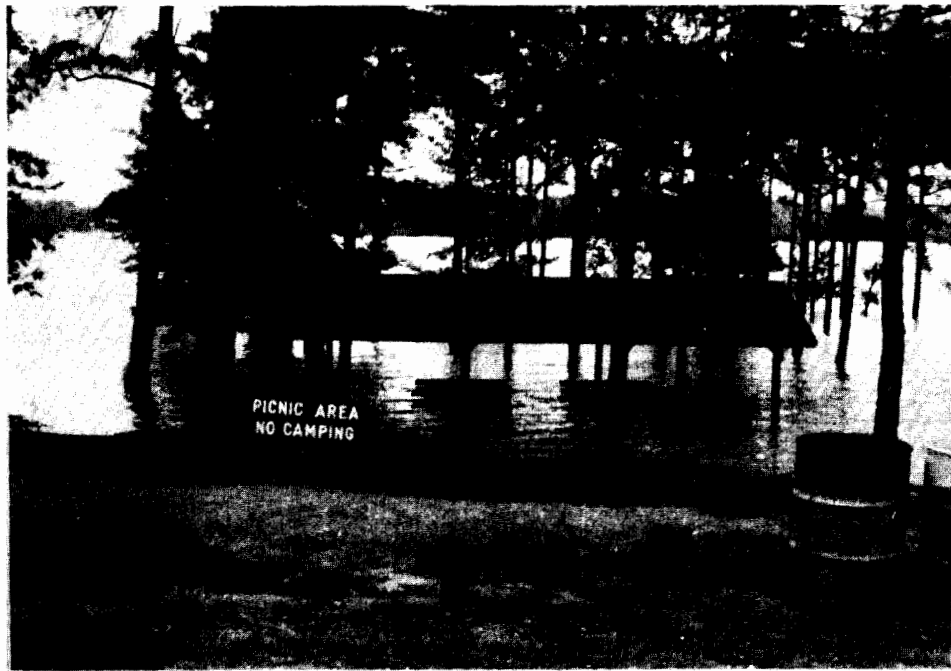
As was discussed in Section 3-03 C, periodic high water associated with the project purpose of flood control can have a serious effect upon recreational facilities at John H. Kerr Reservoir. High pool levels render many facilities unusable. Table 4-10 lists the type and number of facilities that are unusable at a five-year flood frequency pool elevation of 310 feet (m.s.l.). Photos 4-01 and 4-02 show the effect of high water levels on a typical picnic area and camping area at John H. Kerr Reservoir. In some cases, the Facility Development Plan (Chapter 7 of the Master Plan Update), includes future recreation area plans for more facilities than indicated by future needs as described in Section 4-06. These additional facilities could be developed in the future to compensate for temporary or permanent loss of facility use due to high water levels.

TABLE 4-10
NUMBER OF MAJOR RECREATION FACILITIES UNUSABLE DURING
5-YEAR FREQUENCY FLOOD (310' m.s.l.)
JOHN H. KERR DAM AND RESERVOIR¹

RECREATION SITES	CAMP UNITS	PICNIC UNITS	LAUNCH LANES
CORPS OF ENGINEERS RECREATION AREAS			
Palmer Point	45*	15	2
Ivy Hill	6	5	2
Grassy Creek	2	11	2
Longwood	10	9	2
Buffalo	5	7	2
Staunton View		5	2
Bluestone Landing		6	2
Eastland Creek	15	3	2
North Bend Park	29	40	
STATE OF NORTH CAROLINA RECREATION AREAS			
Kimball Point	86	4	
County Line Park		10	2
Bullocksville Park		26	
Satterwhite Point	97	22	5
Nutbush Creek	58		2
Hibernia	114	65	2
Henderson Point	72	14	
TOTAL	539	242	27

¹Source: The State of North Carolina provided figures for its facilities. Figures for COE facilities were taken from maps of existing development.

*These camp units are no longer at the site but can be redeveloped without a cost sharing sponsor.



PHOTOGRAPH 4-01
EFFECTS OF HIGH WATER ON TYPICAL DAY-USE
AREA AT JOHN H. KERR RESERVOIR
(Water Level 314' m.s.l.)



PHOTOGRAPH 4-02
EFFECTS OF HIGH WATER ON TYPICAL
RECREATION AREA ACCESS ROAD
(Water Level 314' m.s.l.)

CHAPTER 5

COORDINATION WITH OTHER AGENCIES

5-01 POLICY

ER 1120-2-400 states, "During the investigation, planning, development, and operation and maintenance of all Civil Works projects, close and continuing coordination will be maintained with Federal, State and local agencies with interests and responsibilities in the fields of public recreation, fish and wildlife, preservation of archaeological and historical resources, and environmental quality."

In accordance with this directive extensive coordination was initiated by the Wilmington District with Federal, State, local agencies, and leaseholders on the project. In addition, public participation meetings were held with a public assistance committee, established to provide input to the Master Plan Update, and the general public. The following sections summarize the coordination efforts undertaken in the preparation of the Master Plan Update. The major concerns of each of these groups, as expressed during the planning process, are also summarized. A list of agencies and groups contacted is presented as Exhibit B to this Master Plan.

5-02 FEDERAL AGENCIES

Federal agencies were contacted early in the planning process to solicit their concerns and suggestions for the Master Plan Update. Some agencies indicated their concerns, others asked to be informed about the progress of the planning effort.

A. Heritage Conservation and Recreation Service (formerly Bureau of Outdoor Recreation). The HCRS Southeast Regional Office reviewed a draft Scope of Work for the project and complimented the "thorough and sound planning approach" represented by the scope. HCRS urged the fullest possible coordination with Virginia and North Carolina, in particular, with regard to utilizing the Statewide Comprehensive Outdoor Recreation Plans (SCORP) of the two states in assessing recreation needs. The SCORP's from each of the two states were used extensively during the recreation use analysis presented in Chapter 4.

B. Environmental Protection Agency. The Environmental Protection Agency also reviewed the draft Scope of Work for the Master Plan Update. EPA expressed interest in the water quality of the reservoir, particularly in the Nutbush Creek arm. EPA suggested that a recently completed Environmental Impact Statement for the Henderson, North Carolina 201 Wastewater Treatment Plant be utilized as a data source for this project.

C. Federal Power Commission. The Federal Power Commission expressed interest in the effects changes in the Master Plan might have on transmission lines and rights-of-way and on the operation of upstream or downstream reservoirs. Most FPC concerns are more closely related to the Reservoir Regulation Plan than they are to the Master Plan.

5-03 STATE OF NORTH CAROLINA

The State of North Carolina participated throughout the planning process in a number of ways. Early in the process State agencies were contacted to express their concerns and review the Scope of Work. Representatives of the State participated on the Public Assistance Committee and were active at all phases of planning review.

A. N.C. Department of Natural Resources and Community Development - Division of Parks and Recreation. The Division of Parks and Recreation was concerned that its plans for the state operated recreation areas be incorporated into the Master Plan Update. The Division provided plans and cost estimates for all proposed new development and facility rehabilitation at the state areas. They also participated in review of the Master Plan document throughout the planning process.

B. Department of Agriculture. The Department of Agriculture expressed interest in the effects of Kerr Reservoir flood control on flooding in the lower Roanoke River Valley.

C. Department of Human Resources - Division of Health Services. The Division of Health Services expressed concern that mosquito abatement programs be continued and offered suggestions as to techniques that could be implemented. Pest control programs are part of the Project Resource Management Plan, Appendix A to the Master Plan.

D. Wildlife Resources Commission. The Wildlife Resources Commission reviewed the preliminary Scope of Work for the project and emphasized the fish and wildlife management programs should be considered during all planning efforts. Representatives of the Commission also met with members of the planning team to discuss their concerns related to the reservoir fishery and water quality for consideration in the Environmental Inventory and Analysis.

5-04 COMMONWEALTH OF VIRGINIA

Representatives of several Commonwealth of Virginia agencies were contacted early in the planning process to contribute to the Scope of Work. The Commonwealth also reviewed each draft of the plan and provided comments when appropriate.

A. Council on the Environment. The Council on the Environment took the role of lead coordinating agency for the Commonwealth. It coordinated all state review of drafts of the Master Plan.

B. Commission of Game and Inland Fisheries. The Commission provided comments on the preliminary Scope of Work for the Master Plan as well as on drafts of the plan. It also provided data and information on the aquatic resources of the reservoir for input into the Environmental Inventory and Analysis.

C. Commission of Outdoor Recreation. The Commission expressed concern that the Commonwealth should be actively involved in all coordination activities in the preparation of the plan. The Commission also wanted to assure that the Virginia Outdoors Plan (the Virginia SCORP) would be utilized in all determinations of recreation needs for the area. The Outdoors Plan was used for all aspects of the recreation use analysis presented in Chapter 4.

D. Department of Taxation. The Department expressed concern that water level fluctuations on Kerr Reservoir have an adverse affect on property values surrounding the reservoir. Smith Mountain Lake and Lake Gaston were cited as reservoirs not experiencing extreme fluctuations that have high surrounding property values. The operation of Kerr Reservoir for its several authorized purposes including flood control and hydroelectric power production necessitates certain storage and flow characteristics which in turn necessitate water level fluctuations.

5-05 LOCAL AGENCIES

Several local agencies were contacted to solicit their comments on the Master Plan Update and to participate on the Public Assistance Committee.

A. North Carolina League of Municipalities. The League objected to a Federal Power Commission proposal to draw additional water from Kerr Reservoir to be utilized for power projects in Virginia and supplemental water supply. The other concern expressed by the League was for an erosion control program for the reservoir shoreline. This question has been addressed in several places throughout the Master Plan.

B. Halifax County Chamber of Commerce. The Chamber of Commerce would like to see that funding is secured for an updated flood control study of the Dan River. They have been promoting such a study for a number of years.

C. Boydton Chamber of Commerce. The Chamber would like to see more camping areas developed with electric, water, and sewer

hookups. They receive several inquiries each year for such facilities.

5-06 PRIVATE INTEREST GROUPS

Several private interest groups were contacted to solicit their input to the Master Plan Update. In addition, some individuals and groups contacted the Corps of Engineers to discuss their particular concerns. The following groups submitted comments or requests for the Master Plan.

A. North Carolina B.A.S.S. State Federation, Inc. The B.A.S.S. Federation expressed concern that the no wake areas surrounding marina mooring areas are taking up an excessive amount of water space. They would also like to see more camping facilities with water and electrical hookups. The high demand for marinas requires that more mooring space be provided and thus more area be designated as "no wake" zones. Additional Class A camping areas are proposed in this Master Plan.

B. Kerr-Buggs Island Lake Protective Association. The Protective Association suggested that the problems of siltation, erosion, and vandalism be addressed in the Master Plan. Both siltation and erosion are discussed in Chapter 11 "Special Problems" and erosion control measures are suggested in Chapter 8 under the title of shoreline stabilization. The potential for vandalism must be considered in the design of all facilities and in assigning manpower to the control of visitor use.

C. Merrifield Acres. Owners of property in the Merrifield Acres subdivision requested that a boat launch be located on government lands adjacent to the subdivision. Although regulations would not permit this, a boat launch is proposed as part of the future development of Soudan Landing, the closest recreation area to Merrifield Acres.

D. Cuscowilla Subdivision. Landowners in Cuscowilla Subdivision requested that land allocations near the subdivision be changed such that private boat docks would be allowed. The new Lakeshore Management Plan has provided areas where docks may be permitted.

5-07 LEASEHOLDERS

Managers of the quasi-public lease areas and concession lease areas of the project were contacted so that they might express their concerns. They also provided plans indicating their future development concepts for their sites. These plans are incorporated into this Master Plan. A list of these leaseholders is provided below.

Mr. H. K. Martin
North Bend Park Marina

Mr. D. L. Meekins
Satterwhite Point Marina (Tar Heel Marina)
Flemingtown Road Marina (Meekins Marina)

Vance County Wildlife Club
Townsville Landing Marina

Mr. Don Diamond
Clarksville Marina

Stateline Baptist Assembly, Inc.

Virginia Tidewater Council G.S.A.

University of North Carolina

Cherokee Council B.S.A.
Burlington, N. C.

North Carolina State University
Raleigh, N. C.

The Methodist Church
Henderson, N. C.

Tuscarora Council B.S.A.

Robert E. Lee Council B.S.A.

Occoneechee Council B.S.A.

Lakeside Camping and Sports Club

Pines of Carolina G.S.A.

N. C. State University Faculty

Presbytery of Granville, N.C.

Lynchburg, Va. Y.M.C.A.

PART 2
DATA SYNTHESIS,
RESOURCE USE
OBJECTIVES AND
DEVELOPMENT PLAN

CHAPTER 6
PROJECT-WIDE
ANALYSIS AND
RESOURCE USE
OBJECTIVES

CHAPTER 6
PROJECT WIDE ANALYSIS AND
RESOURCE USE OBJECTIVES

6-01 INTRODUCTION

The master planning process requires an orderly sequence of data inventory and analysis. The inventory step includes the collection of data on natural, cultural, and economic resources, recreation demand, and facility needs. This data has been presented in Chapters 2, 3, and 4 of this plan. It is the purpose of this chapter to serve as the connection between the data inventory and a workable and environmentally sound development plan. The data synthesis process applied in this chapter culminates in the formulation of resource use objectives for the John H. Kerr Dam and Reservoir Project.

6-02 COMPOSITE RESOURCE ANALYSIS

Data collected in the natural and cultural resource inventories was analyzed to determine the best locations for various categories of land use. A matrix was developed which evaluated ten natural and cultural factors in terms of their influence on six categories of land use. Figure 6-01 illustrates the matrix developed for this analysis. Based on these ratings a profile of optimum environmental characteristics for each land use category can be determined as described below.

A. Intensive Recreation. Intensive recreation will be located on readily accessible lands with high or medium soil and geological capabilities and moderate to flat slopes. They will be located near the reservoir in areas where they do not impact high quality wildlife or aquatic habitats. They are best located in open, upland hardwood, or mixed vegetation types. A high to medium vegetation productivity rating is preferred since these sites are most likely to recover from the effects of development and use. If significant archaeological features are located in or near an intensive recreation area, site plans will be developed to enhance or protect these resources.

B. Low Density Recreation. Lands for low density recreation will avoid environmentally sensitive areas (steep slopes, wet soils, unique vegetation). In most cases they will serve needs such as buffer zones, overflow from intensive recreation areas, and development of low density facilities such as primitive camping areas and trails.

C. Natural Areas. Natural areas will contain outstanding features such as unique habitats, rare or endangered species, highly significant

ENVIRONMENTAL FACTORS

LAND USE CATEGORIES

		LAND USE CATEGORIES					
		VALUE SCALE	INTENSIVE RECREATION	LOW DENSITY RECREATION	NATURAL AREAS	SCIENTIFIC/ EDUCATIONAL	WILDLIFE FOREST RESERVE
SOIL SUITABILITY	HIGH MEDIUM LOW	H-M	-	-	H-M	-	-
SLOPES	STEEP MOD. FLAT	M-F	M-F	-	M-F	-	-
GEOLOGIC SUITABILITY	HIGH MEDIUM LOW	H-M	-	-	UNI- QUE	-	-
EXISTING VEGETATION	COVER TYPE	O # U M	-	UNI- QUE	UNI- QUE	#F	-
VEGETATION PRODUCTIVITY	HIGH MEDIUM LOW	H-M	-	-	-	H-M	H
AQUATIC HABITAT	HIGH MEDIUM LOW	-	-	H	-	-	-
WILDLIFE HABITAT	HIGH MEDIUM LOW	L	H	H	H	H	-
ARCH/HISTORIC SENSITIVITY	HIGH MEDIUM LOW	M-L	M-L	H	H	-	-
ACCESSIBILITY TO RESERVOIR	NEAR FAR	N	N	-	-	-	-
SPECIAL FEATURES		-	-	ANY	ANY	-	-

VEGETATION COVER TYPES

O- OPEN FIELDS
 F- OLD FIELDS
 U- UPLAND HARDWOODS
 M- MIXED WOODLAND

FIGURE 6-01

NATURAL AND CULTURAL RESOURCE COMPOSITE MATRIX

archaeologic or historic sites, highly sensitive environments, or areas needed to preserve the visual integrity of the project's natural setting.

D. Scientific/Educational. Areas of scientific/educational interest may include those with rare or unique features or that have significant interpretive potential. In many cases these resources overlap with natural areas. However, the scientific/educational category is broader and implies resource use rather than strict protection.

E. Wildlife. For purposes of the Composite Resource Analysis "wildlife lands" include areas that provide a rich or highly diverse fauna; a unique species or species assemblage; or a high profile of desirable species which are relatively common in the project area.

F. Forest Reserve. Forest Reserve lands include areas of high vegetation productivity that are not required to meet recreation demand, and all lands not allocated to another use.

Utilizing these profiles, all project lands were allocated to land use categories based solely on environmental (natural and cultural) factors. These allocations are shown on the Natural Resource Composite Map (Plates 6-01 and 6-02). These allocations were utilized in conjunction with the Net Usable Lands Analysis (as described in the following section) as a basis for preparing the Land Allocations Plan.

6-03 NET USABLE RECREATION LANDS

To more fully consider additional factors influencing the location of intensive recreation facilities a more detailed analysis was undertaken. This analysis considered development constraints based on COE facility design guidelines (lands within the 5 year flood pool), management considerations (areas too small or poorly shaped, areas with access problems), recreation desirability (poor water relationship), and physical factors (areas too wet or poorly drained, poor soils, excessive slopes). The product of this analysis is shown on the Net Usable Recreation Lands Map (Plates 6-03 and 6-04).

It should be noted that the process employed in this analysis was accomplished in the same sequence as shown on the map legend. Therefore, once a land area had been eliminated due to any factor, that area was not analyzed in terms of the other factors. For example, if an area was eliminated from intensive development because of its location within the 5-year flood pool zone, that area was not mapped to show other restrictions such as poor soils, steep slopes, etc. The seven major factors applied to this analysis by priority are described below.

- A. Areas within the 5-year flood pool (below elevation 310 m.s.l.).
- B. Areas too small or poorly shaped for development (less than 50 acres, consolidated shape preferred over linear land areas).
- C. Areas too flat or poorly drained for development (generally includes major flood plain areas).
- D. Areas with poor water relationship (developable land located over 1000' from the lakeshore, or areas with limited shore-line frontage).
- E. Areas with poor soils (Suitability Class III).
- F. Areas with excessive slopes (greater than 16%).
- G. Areas with poor access (located more than 1/4 mile from an existing road).

Based on this analysis, a total of 11,750 acres of project lands were identified as Net Usable Recreation Land. It should be noted that this designation does not account for development constraints such as planning, fiscal, or operational policies or problems related to waste disposal, water supply, electrical supply, etc.

Of the total 11,750 acres of Net Usable Lands, approximately 7,300 acres are located within the boundaries of the existing and proposed recreation areas described in Chapter 7. The remaining 4,450 acres could be considered for development if additional lands are needed in the distant future.

6-04 AREAS RECOMMENDED FOR DEVELOPMENT

Previous studies (including the original Master Plan and Resource Management Appendix) had identified 31 land areas to be considered for future recreation area development. The location of these 31 sites (as well as all existing recreation areas) are shown on Plate 4-01.

At this point, it is appropriate to compare the 31 proposed sites with the results of the Net Usable Lands Analysis. Based on this comparison, we find that 14 of the 31 sites are not suitable for development based on the criteria presented in Section 6-03. This conclusion was verified through detailed analysis of each site as shown on the ortho-photo site plans included with this Master Plan Update. The specific limitations associated with each of these sites are described in Chapter 7. Based on these project-wide, and site specific investigations,

the following proposed recreation area sites are not recommended for development:

1. Piney Grove (Plate No. 7-35, Site No. 6)
2. Burrough Mill Landing (Plate No. 7-35, Site No. 7)
3. Nutbush Wood (Plate No. 7-36, Site No. 13)
4. Berry Hill Shores (Plate No. 7-38, Site No. 18)
5. Beaver Woods (Plate No. 7-39, Site No. 23)
6. Duck Island (Plate No. 7-35, Site No. 22)
7. Soudan Village (Plate No. 7-40, Site No. 24)
8. Sunrise Landing (Plate No. 7-42, Site No. 31)
9. Staunton River St. Park Ext. (Plate No. 7-43, Site No. 37)
10. Town View (Plate No. 7-14, Site No. 42)
11. Campers Cove (Plate No. 7-45, Site No. 51)
12. Riverdale Access Area (Plate No. 7-44, Site No. 56)
13. Aaron's Access Point (Plate No. 7-44, Site No. 36)
14. Mooresville Woods (Plate No. 7-38, Site No. 41)

This leaves 17 proposed sites that are considered to be suitable for development. The general ability of these lands to meet projected demand for recreational facilities at John H. Kerr Reservoir are presented in Section 6-05 below.

6-05 COMPARISON OF CAPACITY OF EXISTING AND PROPOSED RECREATION AREAS AND THE RESERVOIR WITH ULTIMATE VISITATION PROJECTIONS

A. Land Capacity. The first step in analyzing the capacity of the existing and proposed recreation sites is to identify the number of acres of land within the designated sites that are actually suitable for intensive development. Table 6-01 summarizes this process. As shown in Table 6-01 there are approximately 15,778 acres of land within the boundaries of the 45 existing and 17 proposed recreation areas. However, only 6,235 acres of this land are actually suitable for development based upon individual site analyses. It should be noted that the site analysis maps presented in Chapter 7

TABLE 6-01

DEVELOPABLE ACREAGE WITHIN EACH
EXISTING AND PROPOSED RECREATION AREA

<u>Site No.</u>	<u>Existing Areas*</u>	<u>Total Site Acreage</u>	<u>Acres of Land Within Each Site Actually Suited For Development**</u>
2	Palmer Point	51	13
4	Kimball Point Recreation Area	80	27
5	County Line Park	225	116
8	Bullocksville Park	455	165
9	Flemingtown Road Marina	73	22
10	Satterwhite Point Park	390	190
11	Nutbush Creek Recreation Area	363	150
12	Williamsboro Wayside	33	7
14A	Townsville Land & Marina	382	235
15	Hibernia Recreation	446	225
16	Henderson Point	329	167
20	Ivy Hill	1,113	300
21	Island Creek	96	12
26	Grassy Creek	17	13
29	Longwood	150	50
32	Clarksville Marina	6	4
33	Buffalo Springs Wayside	10	5
34	Buffalo	24	14
38	Staunton View	51	5
40	Bluestone Landing	12	3
43	Occoneechee State Park	2,690	900
47	Rudds Creek	101	45
49	Eagle Point Landing	123	80
52	Eastland Creek Landing	119	37
54	North Bend Park & Marina	409	187
55	Tailrace Access Area	24	6
57	Hyco Landing	6	0
61	Clover Landing	5	5
66	Clarksville Overlook	5	4
14-Q	Lakeside Camping & Sports Club	2	2
18-Q	N. Carolina State Univ.	113	9
19A-Q	Methodist Board of Education	57	23
19B-Q	Pines of Carolina G.S.A.	145	82
23-Q	N. Carolina State Univ. Faculty	23	0
37-Q	University of N. Carolina	217	105
38B-Q	Presbytery of Granville	194	83
40-Q	Occoneechee B.S.A.	445	325

TABLE 6-01 (CONT'D)

Site No.	Existing Areas*	Total Site Acreage	Acres of Land Within Each Site Actually Suited For Development**
41C-Q	Tuscarora Council B. S. A.	295	219
42B-Q	North State Boating Club	22	15
46-Q	Ft. Bragg	23	10
49A-Q	Cherokee B. S. A.	161	81
49B-Q	State Line Baptist	152	41
49C-Q	Virginia Tidewater G. S. A.	128	87
60-Q	Lynchburg Y. M. C. A.	253	94
64C-Q	R. E. Lee B. S. A.	228	80
	Subtotal	10,246	4,243
	<u>Proposed Areas***</u>		
1	South Dike Park	293	45
3	Keats Peninsula	275	165
17	Long Grass Point	102	18
19	Walnut Hill	125	55
25	Garretts Woods	320	153
27	Turtle Head Peninsula	55	35
28	Buchanans Woods	353	175
30	Soudan Landing	416	130
35	Viking Hills Park	599	147
39	Bluestone Park	710	150
44	Oakleaf Point	515	246
45	Butchers Bayview	268	175
46	Holly Grove	198	97
48	Boydton Landing	375	92
50	Newman Point	218	19
53	Inglewood	382	55
48Q	Future Lease Site	328	235
	Subtotal	5,532	1,992
	TOTAL	15,778	6,235

* Includes Corps areas, lease sites, and public recreation areas operated by others.

** Based on general estimate utilizing the site analysis maps presented in Chapter 7.

*** Does not include the areas eliminated in Section 6-04.

of this Master Plan were utilized to estimate the actual acreage of developable land within the boundaries of each recreation area. Lands suitable for recreation development and use were mapped (at the project and site level) by natural determinants such as soils, slopes, unique features, susceptibility to floods, and existing land use. An examination of the site plans will show that the undevelopable lands within each area are generally required as park entrance corridors, buffers between intensively developed areas, management control, extensive use activities such as nature study or hiking, management control zones or other similar considerations. Since developed recreational lands are available for compatible management activities such as wildlife and forest habitat improvement (as described in Section 7-02); and since all future recreation areas are available for authorized management activities on an interim basis, the margin between total recreation site acreage and developable acreage within each site is justified.

The second major step in estimating the capacity of the recreation areas is to determine an average use density to be applied to the intensive recreational land areas. This average use density has been calculated to be 10 people per acre as shown below. Use densities for each activity are conservative and were generally based on facility design criteria as presented in Exhibit A to this plan. Naturally, a change in the mix of facilities or in the use density figures themselves; or a change in the amount of usable lands would affect the carrying capacity of the project's recreation sites.

<u>Activities</u>	<u>Use Density</u> (people per acre)
Camping (tent/trailer)	10
Camping (primitive)	5
Camping (group)	20
Picnicking	20
Boat Access & Swimming	15
Bank Fishing	4
Hiking	2
Biking	6
TOTAL	82

$$\text{Average use density} = 82 \div 8 = 10 \text{ people/acre}$$

At this point it is possible to calculate a total use capacity for any given day by multiplying the average use density by the total number of acres that are suitable for intensive development. Using this figure to represent the number of visitors on an average weekend day, we can then compute annual carrying capacity (in terms of visitor days) for the project's designated recreation land areas as follows:

1. 6,235 acres of developable land X 10 people/acre = 62,350¹ people on an average weekend day on designated lands
2. 62,350 X 2 = 120,700 Average weekend attendance during the recreation season
3. $\frac{120,700}{.75} = 160,933$ Average weekly visitation based on ratio of average weekend attendance to average weekly attendance
4. 160,933 X 22 = 3,540,526 Seasonal visitation during a 22-week period (May-Sept.)
5. $\frac{3,540,526}{.75} = 4,720,701$ Annual visitation on developable recreation lands based on 75 percent attendance occurring during the 22-week recreational season
6. To account for land capacity on undesignated lands we find:
 $\frac{4,720,701}{0.85} = 5,553,766$
 5,553,766 - 4,720,701 = 833,065 Annual visitation on other project lands based on 85 percent of annual visitation occurring on designated lands
7. Therefore, total land-based capacity is estimated to be:
 4,720,701 + 833,065 = 5,553,766 Annual visitor days

B. Water Capacity. If it is assumed that 6 acres of water are needed for each boat, and that approximately 80 percent of the reservoir is available for boating (based on the power pool elevation 300 feet), the reservoir capacity may be determined as follows:

Formula:

$$\text{Reservoir Capacity} = \frac{\text{Usable Surface Acres} \times \text{Average Group Size} \times \text{Turnover Rate} \times \text{No. of Weekend Days \& Holidays in Peak Season}}{6 \text{ acres/boat} \times \% \text{ of Use in Peak Season} \times \% \text{ of Peak Season Use that Occurs on Weekends and Holidays}}$$

¹It should be noted that this figure is almost double the daily project-wide design load figure calculated for the year 2030 as shown in Section 4-06. This indicates that there are ample developable recreation sites available to meet future demand.

Application:

$$\text{Reservoir Capacity} = \frac{(48,900 \times .8) \times 3 \times 1.5 \times 44}{6 \times .75 \times .75}$$

Reservoir Capacity = 2,295,040 Annual Visitor Days

C. Project Capacity. Total project capacity (in terms of visitor or recreation days, which is the same unit used in the projection of annual visitation and other analyses performed throughout this plan) may now be calculated by adding total recreation land area capacity (5,553,766 annual visitor days) to the total water capacity (2,295,040). This yields a TOTAL PROJECT CAPACITY of 7,848,806 annual visitor days.

If we compare the total project capacity (based on usable reservoir area at normal pool and the lands that have been, or that are proposed for development in this plan) with the 2030 visitation of 4,315,000 annual activity days, it is evident that sufficient recreational land areas are available to accommodate anticipated facility needs.

6-06 RESOURCE USE OBJECTIVES *- see page 55*

In accordance with ER 1105-2-167 planning objectives for the use of a project resources have been established. These objectives are defined as "clearly written statements, specific to a given project, which specify the attainable options for resource use as determined from study and analysis of resource capabilities and public needs." The following resource use objectives reflect the results of the detailed analysis of natural, cultural, and recreation resources as well as the projected demand for recreation facilities. The objectives are grouped under headings of recreation use, forest, fish, and wildlife resources, and project operations.

1. Recreation Use

- a. To plan for large functional sites for optimum design of road and utility costs, operation and maintenance expenses, and ease of user fee collection and the prevention of vandalism.
- b. To provide additional boat launching facilities to meet present and future demands, particularly along the major transportation corridors (U.S. Highways 15 and 58).
- c. To update recreation design standards in the development of new facilities and rehabilitation of existing facilities.

- d. To preserve, protect, and interpret the archaeologic and historic resources that occur on project lands.
- e. To eliminate conflicts between day use and overnight use in existing recreation areas, and to provide for the separation of conflicting uses in future facility development.
- f. To provide facilities for the launching, storage, mooring, fueling, and other needs of both motorized and non-motorized boats.
- g. To provide a visitors center for the dissemination of information, and interpretation of the project's natural and cultural resources.
- h. To provide self-sustaining facilities that enhance the year round recreation use of project lands.
- i. To make a number of suitable parcels available for future cost shared development should a partner be identified.
- j. To identify and designate areas suitable for development by private entities for group camps, destination parks, marina concessions, etc.
- k. To designate areas for the safe operation of seaplanes on project waters.
- l. To reduce conflicts between swimmers and boaters on the reservoir.

2. Forest, Fish and Wildlife Resources

- a. To minimize the susceptibility of project lands to future bark beetle infestations and other destructive natural forces through forest management practices.
- b. To adopt a management program which provides for the enhancement and use of the Kerr Reservoir warm water sport fishery.
- c. To concentrate forest management practices on areas identified as being highly productive in order to optimize the benefits of forest management.
- d. To provide for the management and enhancement of native game and non-game species for hunting and nature study.

- e. To develop interpretive programs and self-guided trails for visitor education related to forest, fish, and wildlife resources; and management programs at John H. Kerr Reservoir.

3. Project Operations

- a. To consolidate existing recreation areas for more effective and efficient recreation management.
- b. To provide access to all project lands for purposes of project operations.
- c. To support and encourage non-Federal entities in assuming greater responsibility for the operation and maintenance of recreation, fish and wildlife, and other natural resources activities under the Code 710, Cost-Share Program.

CHAPTER 7

FACILITY DEVELOPMENT PLAN

7-01 INTRODUCTION

The information presented in this chapter represents the culmination of the data inventory, data analysis, and resource use objectives developed in chapters 1-6 of the plan. The chapter begins with a description of the land and water use allocations that are intended to guide the overall management of the project's resources. Other major components of this chapter include an analysis of the existing and proposed distribution of recreation facilities, conceptual site plans for each recreation area, a general listing of major interpretive features, and recommendations for inter-site trail systems. The concluding sections of the chapter prioritize all proposed development and discuss specific plans for rehabilitation and relocation of existing facilities.

It should be noted that all of the recommendations and physical development plans presented in this chapter have been carefully coordinated with the comprehensive data base assembled in previous chapters. Particular emphasis was placed on the Natural Resource Composite Map and the Net Usable Recreation Lands Map as presented in Chapter 6.

7-02 LAND USE ALLOCATIONS

The land use allocation plan for John H. Kerr Reservoir provides the basic framework that will guide the development, management and operation of all project resources and facilities. The Natural Resource Composite (as described in Chapter 6) was extremely useful in determining the proper allocation of all project lands. It should be noted that the land classifications shown on the Natural Resource Composite represent the optimum classification, based solely on the combined resource features of each area. In some cases, these "optimum" designations had to be adjusted during the preparation of the Land Allocations Map (Plates 7-01 and 7-02). These adjustments were generally associated with honoring past commitments to long-term lease agreements and with major recreation areas that have already been extensively developed. However, other than these few exceptions, the land use plan presented on Plates 7-01 and 7-02 represents a conscientious and systematic effort to match resource capabilities with proposed management activities.

The following paragraphs define the intent of each of the five land use allocations. Table 7-01 indicates the acreage assigned to

each allocation category. It should be noted that all lands below elevation 326 feet mean sea level were acquired for flood control purposes and have a primary allocation for Project Operations. This includes approximately 49,254 acres of the 55,754 acres of fee owned land above elevation 300 feet m.s.l. The land allocations indicated in Table 7-01 and on Plates 7-01 and 7-02 that fall below elevation 326 indicate a dual use allocation for these lands. The 326 foot contour is shown on the working file land allocation maps.

TABLE 7-01

SUMMARY OF LAND USE ALLOCATIONS
JOHN H. KERR DAM AND RESERVOIR

LAND USE CATEGORY	ACRES
Project Operations	264
Recreation	
Existing Intensive Use	7,864
Future Intensive Use	6,022
Existing Low Density Use	217
Future Low Density Use	2,782
Natural Areas	5
Wildlife Management and Forest Reserve	38,600
Easement Lands	10,509
Total Project Lands Above Elevation 300'	66,263

A. Project Operations. Lands in this category are allocated to provide for the safe, efficient operation of the project for authorized purposes other than recreation and fish and wildlife. These lands include the lands on which the operational structures, maintenance and storage facilities, and/or administrative offices are located and all lands below elevation 326 feet m.s.l.

B. Intensive Recreation. Intensive recreation areas are those lands allocated for intensive recreation development to meet the needs of the public. In most cases these areas will be provided with electrical utilities, paved roads, waterborne sanitary facilities and a relatively high level of recreational facility development. Although these lands have the ability to sustain intensive use and development, a carrying capacity does exist. Administrative control along with proper facility layout and design will help to insure that this capacity is not exceeded. All quasi-public lease areas are allocated to intensive recreation. Although the intensity of development may vary, all these lands are available for intensive development.

Wildlife management or forestry practices will be permitted on these lands as related to multiple recreational use (demonstration plots, landscape planting for shade, screening, noise control, etc.). Hunting will be prohibited in these areas after they have been developed for intensive recreational use.

Interim use of these lands may include activities such as primitive camping, hiking, nature study, wildlife management and forest management. Such uses are allowed as management tools to preserve, enhance or develop desirable spatial or aesthetic characteristics in support of the long range plan for high density recreation. Hunting may be permitted during the interim period, depending upon compatibility with other interim uses.

C. Low Density Recreation. Lands allocated for low density recreation are suitable for some recreation uses but are limited by such factors as steep slopes, shallow soils, limited access, etc. In many cases these areas serve functional needs such as buffering, overflow from intensive recreation areas, and linking intensive developments.

Low density uses appropriate for this land category include: ecological workshops and forums, trails, boat-in primitive camping, and picnicking, hunting, or other activities that will not create high visitor usage. Wildlife management and habitat development will be encouraged on these lands. Interim uses may consist of agriculture, forest management, wildlife enhancement and other activities intended to improve the experience of recreationists using these lands.

D. Natural Areas. Natural areas are lands allocated for the preservation of scientific, ecological, historical, archaeological, or visual values. Limited or no development is recommended on lands designated as natural areas. In general such lands will contain high quality habitats, rare or endangered species, significant archaeological or historic sites, or highly sensitive environments. The spring at Buffalo Springs Wayside is the only designated natural area at Kerr Reservoir.

E. Wildlife Management/Forest Reserve. Lands allocated to this category are managed to support a wide variety of flora and fauna. Timber is harvested only when required to achieve management objectives such as reduction of fire hazard, elimination of disease or insect vectors, wildlife enhancement, maintenance of stand vigor and diversity, and maintenance of a visually pleasing and ecologically sound environment.

Wildlife Management/Forest Reserve lands may be available for compatible low density recreation activities such as trail development, hunting, or primitive camping. These lands also provide buffers for high and low density recreation areas and may serve as a source of

plant material for landscaping. All the islands in the reservoir have been allocated to Wildlife Management/Forest Reserve.

It should be noted that this category includes lands with a wide variety of resource features. Although some areas will be well suited for rather intensive development techniques (such as clearing small areas for developing wildlife food plots, cultivation of row crops for wildlife, or planting hedges for wildlife cover), most of this land area is characterized by a number of site limitations such as steep slopes, shallow soils, small size and lack of access. Therefore, it is important that each given parcel of land is carefully matched to an appropriate set of management techniques.

F. Flowage Easements. Lands over which a flowage easement has been acquired are not allocated to any of the above land use categories. These lands are available only for flooding should flood control measures be necessary. The Corps of Engineers has a responsibility to assure the safety of the public on waters adjacent to these easement lands and navigational responsibilities in these shoreline waters. Adjoining landowners who desire to place floating facilities in these areas must secure a permit from the Resource Manager.

7-03 WATER USE ALLOCATIONS

The water use plan presented below is designed to protect the boating public, minimize conflicts between water and land use activities, and to protect sensitive environmental resources. Three water use categories are proposed for John H. Kerr Reservoir including, unrestricted boating, no wake zone, and restricted use. Definitions of these categories are described below. Areas allocated to each category of water use are shown on Plates 7-03 and 7-04. These Plates also illustrate the location of all existing and proposed buoys and markers that are required for proper management of the reservoir. The addition or deletion of any navigation aids may be authorized by the appropriate management agency.

A. Unrestricted Boating. Waters allocated to the unrestricted boating category are available for all water-oriented recreation activities. Most of the reservoir area has been allocated to this category. These waters may be used for activities such as skiing, pleasure boating, sailing, and fishing.

B. No Wake Zone. Speeds of craft navigating water allocated to this category are restricted to levels which will not create damaging waves, safety hazards, or undue disturbance to fragile ecosystems. The following types of waters are allocated to this category.

1. Waters proximate to boat ramps, beaches, marinas or other facilities which might be physically damaged by wave action induced by moderate or high-speed boat use.

2. Water areas that present dangers to boats traveling at high speeds due to shallow water depth, narrow channels, or submerged obstacles.

C. No Boating. The No Boating category applies to water areas which are buoyed off, prohibiting watercraft beyond a designated point. These areas are located around operational structures such as the dam and water intake structures.

D. Seaplanes. In accordance with ER 1130-2-411 the potential for use of seaplanes at John H. Kerr Reservoir has been investigated. If operated under the guidelines adopted in ER 1130-2-411 the negative effects of seaplane use at John H. Kerr Reservoir would be negligible. Such expansion of recreation use of the project would provide a public benefit. Therefore, it is recommended that seaplanes be permitted to operate at John H. Kerr Reservoir under the guidelines adopted by the Chief of Engineers. Areas determined to be suitable for take-off and landing of seaplanes are shown on Plates 7-03 and 7-04.

7-04 RECREATION FACILITY DISTRIBUTION

Prior to the preparation of facility development plans for each specific recreation area, (as presented in Section 7-05) the planning team conducted an evaluation of the distribution and use of existing facilities. Existing facilities that are overused or underused were identified. Other factors that were considered in this analysis included projected facility needs, local and regional transportation patterns, location and potential growth of population centers, environmental features, and development/management capabilities.

Based on a subjective evaluation of these factors, the planning team developed an ideal distribution plan for all existing and future recreational facilities. At this point, the Natural Resource Composite, the Net Usable Recreation Lands analysis, and the specific site analyses (Plates 7-07 through 7-45) were utilized to identify land areas that were most capable of meeting the physical requirement of the "ideal" distribution plan. The recommended modifications to existing areas, and facilities for all future areas (as presented in Section 7-05) are based upon an attempt to implement the ideal plan.

The Recreation Use Pattern Map (Plates 7-05 and 7-06) shows the proposed distribution of major recreation facilities. Also shown are areas where existing uses will be eliminated due to conflicts or inappropriate use. Table 7-02 presents the total acreage above elevation 300 feet m.s.l. and the real estate tract numbers for all existing and proposed recreation areas.

TABLE 7-02A

TOTAL ACRES AND TRACT NUMBERS FOR ALL EXISTING AND
PROPOSED RECREATION AREAS; JOHN H. KERR RESERVOIR
EXISTING CORPS OF ENGINEERS OPERATED AREAS

AREA	ACRES	TRACT NUMBERS
Palmer Point	51	A-13, 29
Ivy Hill	1,113	C-285E, 249, 251-53, 257-59, 261 262, 264, 266, 268, 269, 286, 287
Island Creek	96	C-289, D-303, 305-07, 310-12, 324
Grassy Creek	17	Q-1607
Longwood	150	F-540, 541A, 542, 543, 545, 555-57
Buffalo Springs Wayside	10	U-2015A, B
Buffalo	24	U-2003, 2005, 2016A, 2017, 2018
Staunton View	51	R-1778, 1779, LL-3702A
Bluestone Landing	12	R-1720
Rudds Creek	101	H-722, 741, 742, 791
Eagle Point Landing	123	B-102, 138, 139
Eastland Creek	119	B-104-115
North Bend Park and Marina*	409	A-4, 5, 6, 9, 11, B-101
Tailrace Access	24	A-3, 11
Clarksville Overlook	5	G-699B
Subtotal (acres)	2,305	

*Includes marina concession lease.

TABLE 7-02B

TOTAL ACRES AND TRACT NUMBERS FOR ALL EXISTING AND
PROPOSED RECREATION AREAS; JOHN H. KERR RESERVOIR
EXISTING AREAS OPERATED BY OTHERS

AREA	ACRES	TRACT NUMBERS
Kimball Point	80	I-829, 862
County Line Park	225	I-819-21, 823-27, 831
Bullocksville Park	455	J-947-56, 958-60, M-1200, 1237-38
Flemingtown Road Marina	73	M-1223, 1239, 1241, 1247, 1248
Satterwhite Point	390	J-961-70, M-1245-46, 1252
Nutbush Creek	363	O-1401, 1417-22, 1273, 1475
Williamsboro Wayside	33	L-1100, 1150, 1155
Townsville Landing	382	K-1039-41, L-1101-06
Hibernia	446	K-1030, 1032, 10044-45, 1060-61

TABLE 7-02A (CONT'D.)

AREA	ACRES	TRACT NUMBERS
Henderson Point	329	I-803, 811-13, K-1009-14
Clarksville Marina	6	X-2300E, 2307-08, 2313E, 2314-15
Staunton River State Park Extension	551	GG-3201-3, 3205-07
Occoneechee State Park	2,690	G-600-01, 604, 630-31, 635, 638-41, 643-45
Hyc0 Landing	6	AA-2647
Clover Landing	5	NN-3909
Subtotal (acres)	6,034	

TABLE 7-02C

TOTAL ACRES AND TRACT NUMBERS FOR ALL EXISTING AND
PROPOSED RECREATION AREAS; JOHN H. KERR RESERVOIR
PROPOSED RECREATION AREAS

AREA	ACRES	TRACT NUMBERS
South Dike Park	293	A-15, 17, 18, 20-23, 27-28, 75, C-10
Keats Peninsula	275	A-43-49, 50-54
Piney Grove*	62	I-850, 873
Burrough Mill Landing*	68	J-925-27, 934-35
Nutbush Woods*	38	L-1132
Long Grass Point	102	A-57-58, C-200-02, 204-05
Berry Hill Shores*	39	C-228-29
Walnut Hill	125	C-243, 270
Duck Island*	39	D-300, 301
Beaver Woods*	223	D-346-47, 353, N-1306A, 1309, 1310A
Soudan Village*	383	D-303, E-402-7, 409-18, 420, 422-24, 426, 427, 478-480, 487, 489E, 490EB, F-587
Garretts Woods	320	E-453-55
Turtle Head Peninsula	55	E-450A, 482
Buchanan's Woods	353	E-441, 443-46, F-534-35, 558, 574
Soudan Landing	416	F-517B-C, 519, 523-26, 528, 563-4, 570, 573A, 576-80, 587
Sunrise Landing*	35	F-511, 513-15
Viking Hills Park	599	U-2033-36, 2038-39
Aaron Access Point*	38	AA-2604-06
Bluestone Park	710	R-1760, 1761, 1762A, 1773
Mooresville Woods*	49	R-1717, 1718A
Townview*	17	R-1702-3, 1716
Oakleaf Point	515	B-178, G-618-21, H-789

TABLE 7-02C (CONT'D.)

AREA	ACRES	TRACT NUMBERS
Butchers Bayview	268	G-615-17, 642, H-702, 720
Holly Grove	56	H-719, 723, 755-56
Boydton Landing	375	B-154-57, 178-79
Newman Point	218	B-120-22, 167
Campers Cove*	48	B-119, 122
Inglewood	382	B-100, 101
Riverdale Access*	66	JJ-3525
Subtotal (acres)	6,167	
TOTAL	14,506	

*Areas not proposed for development

7-05 EXISTING RECREATION AREAS

A. General. There are forty-five existing recreation areas at John H. Kerr Reservoir. Of these, fifteen are operated by the Corps of Engineers, nine are operated by the State of North Carolina, three are operated by the State of Virginia, two are operated by private concessionaires, and sixteen are operated under lease to quasi-public groups.

This section and Section 7-06, page 170, present brief descriptions of each existing and proposed recreation area, respectively. These descriptions were prepared in outline format in an attempt to provide a clear and concise statement of pertinent factors such as location, access, physical characteristics, positive and negative resource features (in terms of recreational development), existing facilities, proposed facilities, and design intent.

B. Site Plans. Each site description is accompanied by a conceptual site plan included as Plates 7-07 through 7-45 of the map portfolio. These site plans have been prepared on orthophotographic base maps. It should be recognized that orthophotographs are corrected to eliminate all photographic distortion. Therefore, accurate direct measurement of area and distance is provided, along with an abundance of information on existing land features.

C. Site Analysis. The graphic site analysis conducted for each recreation area was designed to illustrate features that restrict development potential. The graphic techniques applied in the site analyses were developed to highlight the areas that are least suitable for development. Therefore, the "darker" the site analysis features appear, the less suitable that area is for development. Positive features, such as attractive forest stands and scenic views, were generally indicated with a note. It should be recognized that site analysis features were not mapped within existing facility areas to

insure maximum clarity in these locations; and since the information would generally not be useful in future planning or design efforts.

D. Existing Facility Inventory. An on-the-ground inventory of all existing facilities was conducted during the preliminary stages of the master planning process. All areas that support existing recreational facilities have been outlined on the site plans; and major facilities are listed in the narrative descriptions and on the site plans. Although this approach does not provide detailed information on the design of each site, it represents an excellent way to evaluate the basic conceptual requirements of each area, and the relationship of all of the existing and proposed areas. Detailed base maps (at a scale of 1" = 100') have been prepared for each existing recreation area to show the exact location of all existing facilities. These detailed maps (on file at the Wilmington District Office) will be utilized to prepare specific feature design plans on an as-needed basis.

In many cases, recommendations have been made to redesign (through relocation or rehabilitation) existing recreational areas. The primary considerations in the redesign of existing recreation areas were to provide for self-sustaining facilities, to gain greater control over use of the areas, to eliminate conflicts between uses, and to distribute facilities in accordance with recreation demand.

E. Future Facilities. Graphic presentation of all future facilities shown on the site plans has been limited to bubble diagrams and major access road alignment. This conceptual approach is consistent with current South Atlantic Division guidance; and represents an appropriate planning effort considering the tentative nature of all future development as a result of current cost-sharing requirements. The major intent of the future development plans is to indicate the general potential of each site for development, to establish a logical pattern and distribution of facilities and activities throughout the project, and to identify land areas that are most capable of supporting intensive recreational use.

Proposed development for state operated areas and quasi-public lease areas is based on plans submitted by the appropriate state agency, or lease area operator.

F. Cost Estimates. During the early planning stages of this report, it was recognized that preparation of conceptual plans could result in considerable difficulty in developing reasonably accurate cost estimates; i.e., if an area is not planned to the extent that all major buildings, roads, utilities, etc., are shown on the site plans, how can a reasonable cost estimate be prepared? To overcome this problem several unique methodologies were developed to relate the site plans with the cost estimates presented in Chapter 10.

The basic approach that was developed involved the definition of approximately 30 major cost items that relate directly to each future development "bubble." For example, one of the major cost items was designated as a "50 Unit Class A Campground." Chapter 10, Cost Estimates, lists the individual items, quantities, and unit costs associated with a typical 50 Unit Class A Campground (See Table 10-03). These "typical" cost items and quantities were based on an analysis of a considerable number of similar facility areas for Corps of Engineers projects. During this analysis, the average space (land area) requirements of each major item was also determined. This "space" requirement was then used to determine the suitability of each potential development area to accommodate a certain number and type of facilities.

Furthermore, each individual cost item is defined in detail in Chapter 10. These detailed definitions were necessary as a point of reference to develop cost estimates that are reliable, reproducible, and subject to updating during future planning or design efforts.

G. Index. To assist the reader in locating a particular recreation area within the text, or the map portfolio, an index is provided on the following two pages that lists each existing area, its site number, portfolio plate number, and the page of the text that includes the narrative description. The proposed recreation areas are introduced on page 171; and a similar index is provided for the proposed sites following that introduction.

Index to Existing Recreation Areas

A. Areas Operated by the Corps of Engineers

<u>Site</u>	<u>Site No.</u>	<u>Plate No.</u>	<u>Page</u>
Palmer Point	2	7-07	118
Island Creek	21	7-07	119
Grassy Creek	26	7-07	120
Ivy Hill A	20A	7-08	121
Ivy Hill B	20B	7-09	121
Buffalo Springs Wayside	33	7-08	123
Staunton View	38	7-08	124
Longwood	29	7-10	125
Buffalo	34	7-10	126
Tailrace Access Area	55	7-10	127
Bluestone Landing	40	7-11	128
Rudd's Creek	47	7-11	129
Eastland Creek Landing	52	7-11	131
Eagle Point Landing	49	7-13	132
North Bend Park and Marina	54	7-12, 13	133
Clarksville Overlook	66	7-14	135

B. Areas Operated by Others

<u>Site</u>	<u>Site No.</u>	<u>Plate No.</u>	<u>Page</u>
Kimball Point	4	7-15	136
Henderson Point	16	7-15	137
County Line Park	5	7-16	138
Bullocksville Park	8	7-17	139
Flemingtown Road Marina	9	7-18	141
Clarksville Marina	32	7-18	142
Satterwhite Point Park	10	7-19	143
Nutbush Creek Recreation Area	11	7-20	145
Williamsboro Wayside	12	7-20	146
Townsville Landing and Marina	14A, B	7-21	147
Hibernia Recreation Area	15	7-22	148
Occonechee State Park	43A, B, C, D	7-23, 24, 25	150
Hyc0 Landing	57	7-26	152
Clover Landing	61	7-26	153

C. Quasi-Public Lease Sites

<u>Site</u>	<u>Site No.</u>	<u>Plate No.</u>	<u>Page</u>
Lakeside Camping and Sports Club*	14-Q	7-27	154
University of North Carolina	37-Q	7-27	155
North State Boating Club	42B-Q	7-27	156
North Carolina State University	18-Q	7-28	157
Fort Bragg	46-Q	7-28	158
Cherokee B.S.A.	49A-Q	7-28	159
R.E. Lee Boy Scouts	64C-Q	7-28	160
Methodist Board of Education	19A-Q	7-29	161
Pines of Carolina	19B-Q	7-29	162
North Carolina State University Faculty	23-Q	7-29	163
Presbytery of Granville	38B-Q	7-29	164
Tuscarora Council B.S.A.	41C-Q	7-30	165
Stateline Baptist Assembly	49B-Q	7-31	166
Virginia Tidewater G.S.A.	49C-Q	7-31	167
Lynchburg Y.M.C.A.	60-Q	7-31	168
Occonechee B.S.A.	40-Q	7-32	169

*This site is leased to a private club.

A. AREAS OPERATED BY THE CORPS OF ENGINEERS
PALMER POINT (2)
PLATE 7-07

I. General Description

- A. This area contains approximately 50 acres.
- B. It is located about three miles southeast of the dam.
- C. Access to the area is from Virginia State Road 827.

II. Site Analysis

- A. About 80% of the site is already developed.
- B. The west shoreline of the point is a natural beach which appears to be heavily used.
- C. There is an attractive undeveloped tree covered parcel on the east side of the point.

III. Existing Facilities

- A. At one time the area was operated as a marina under lease to a private concessionaire. This lease is no longer operable.
- B. Forty-five campsites once located at this site are no longer there.
- C. Twenty picnic units are located on the site including one shelter.
- D. The site contains a two lane boat launch and 25 car/trailer parking spaces.
- E. A large beach is located at the site as part of the day-use development.

IV. Design Intent

- A. This area is popular for picnicking, swimming, and boating.
- B. The boat launch will be relocated due to frequent flooding and siltation at the present location.

V. Proposed Facilities

- A. The 45 campsites will be relocated to Ivy Hill.
- B. The 20 existing picnic units will be rehabilitated.
- C. The existing boat launch and associated parking will be relocated to a new area on the site.
- D. The existing beach will be rehabilitated.

ISLAND CREEK (21)
PLATE 7-07

I. General Description

- A. The Island Creek site includes approximately 96 acres.
- B. It is located adjacent to Virginia State Road 825 at the west end of Island Creek Dam.

II. Site Analysis

- A. The area is heavily wooded with pine and upland hardwoods.
- B. A power line runs along one peninsula of the site limiting its attractiveness for recreation use.
- C. Slope factors limit development suitability on small areas of the site.

III. Existing Facilities

- A. The site is presently developed for boat launching with two launch lanes and eight car/trailer parking spaces.
- B. Nine picnic sites are located at the boat launch.
- C. An undeveloped launch area on the site is lightly used.

IV. Design Intent

- A. Day use facilities at Island Creek will be expanded as a support facility for the boat launch.

V. Proposed Facilities

- A. The nine existing picnic sites at Island Creek will be relocated to the proposed new day use area.
- B. A new day use area will be developed containing 25 new picnic units (cost shared).

GRASSY CREEK (26)
PLATE 7-07

I. General Description

- A. This small area contains approximately 17 acres.
- B. It is located on the Virginia/North Carolina State line on Virginia Route 723 and North Carolina Route 1443.
- C. The site is located on the upper end of Grassy Creek about 6 miles on the water from the main reservoir.

II. Site Analysis

- A. Due to the isolated location of this site the primary users are local small town and rural residents.
- B. The area is slightly rolling and is surrounded by agricultural land uses.
- C. The site primarily consists of a mild slope and a small cove.

III. Existing Facilities

- A. The area is primarily used as a picnic site (there are 21 existing picnic units) and a boat launch.
- B. The boat launch has two lanes and 20 car/trailer parking spaces.
- C. One of the picnic areas contains a shelter with three picnic tables.
- D. Eleven non-fee Class B camp units are located on the site.
- E. All existing facilities are in need of rehabilitation.

IV. Design Intent

- A. The area is intended for use by picnickers and for boat launching.
- B. It is anticipated that users will primarily be local residents.
- C. Due to conflicts between day and overnight use, the camp sites should be relocated to a new site.

V. Proposed Facilities

- A. All existing picnic units and the boat launch will be rehabilitated.
- B. The existing campsites will be relocated and 10 new picnic units will be built on the former campground (to be cost shared).
- C. Five of the relocated camp units will be allocated to Ivy Hill and six will be allocated to Longwood.

IVY HILL (20)
PLATES 7-08 and 7-09

I. General Description

- A. Ivy Hill consists of two large broad peninsulas containing approximately 1,113 acres.
- B. It is located on the south side of the main reservoir half-way between Clarksville and the dam.
- C. Virginia State Road 825 terminates on the site.

II. Site Analysis

- A. The northern peninsula is the larger of the two areas.
- B. It is heavily wooded and contains several old fields. It is rated as high quality wildlife habitat.
- C. The southern peninsula is also heavily wooded and is where existing development is located.
- D. Rolling hills and diverse vegetation create high visual quality throughout the site.
- E. A high voltage powerline runs across the southern side of the larger peninsula.
- F. The shoreline adjacent to the boat launch and day use area is eroding from wind/wave and boat action.

III. Existing Facilities

- A. The southern peninsula is developed for camping, day use, and boat launching.
- B. The camp area at Ivy Hill is one of only two non-fee camp areas at Kerr Reservoir.
- C. The day use area contains a picnic shelter with 4 tables and 13 other picnic units.
- D. A two lane boat launch with 35 car/trailer parking spaces are located adjacent to the day use area.
- E. All existing facilities are heavily used and would benefit from rehabilitation.

IV. Design Intent

- A. Non-fee camping at the site will be maintained.
- B. The northern peninsula will be intensively managed for wildlife and developed into a wildlife management interpretive area.

V. Proposed Facilities

- A. All existing facilities at Ivy Hill will be rehabilitated.
- B. A washhouse will be included in the new campground development.
- C. Shoreline protection measures will be implemented on approximately 100 yards of shoreline around the boat launch and day use area.

- D. A new camp area will be developed on the southern peninsula and will contain 50 additional Class B units.
- E. This new campground will be a fee area.
- F. A 3.1 mile trail is proposed for the northern peninsula of Ivy Hill to allow interpretation of forest and wildlife management techniques.

BUFFALO SPRINGS WAYSIDE (33)
PLATE 7-08

I. General Description

- A. This small area contains about 10 acres.
- B. It is located west of Clarksville on Virginia State Road 732 just north of U.S. Highway 58.
- C. The site was once a popular spa development because of the supposed medicinal qualities of its spring water.

II. Site Analysis

- A. The site is a small roadside picnic area.
- B. Vegetation on the site is in poor condition.

III. Design Intent

- A. The site should continue to be used primarily as a roadside rest area.
- B. A marker should be placed to commemorate the historic interest of the spring and resort spa.

IV. Proposed Facilities

- A. The only proposed development is to rehabilitate the six existing picnic units on the site.

STAUNTON VIEW (38)
PLATE 7-08

I. General Description

- A. This area contains approximately 50 acres.
- B. The site is located on the north shore of the reservoir about a mile south of U.S. Highway 15.
- C. Access to the site is from Virginia State Road 699.

II. Site Analysis

- A. The site has severe constraints for intensive recreation due to soils on about 60% of its area.
- B. The area is flat and low lying.
- C. Shoreline erosion is occurring along much of the site.
- D. There is a poor spatial relationship between the existing day use area and boat launch area.

III. Existing Facilities

- A. The existing day use area contains eight picnic units.
- B. The boat launch area has a two lane ramp and 37 car/trailer parking spaces.

IV. Design Intent

- A. This area is well located for a boat launch to serve U.S. Highway 15.
- B. The day use area is poorly located in relation to the boat launch and the picnic units are flooded at high water levels.

V. Proposed Facilities

- A. It is proposed that the day use area be phased out and that seven of the picnic units be relocated to North Bend Park.
- B. The eighth picnic unit will be relocated to Longwood as a campsite and costed as a relocated campsite.

LONGWOOD (29)
PLATE 7-10

I. General Description

- A. The Longwood area contains 150 acres and is located adjacent to U.S. Highway 15.
- B. The site is located 3 miles south of Clarksville, Virginia.

II. Site Analysis

- A. The largest part of the site is a hillside sloping to a cove.
- B. The soils and slopes on the site are quite suitable for intensive recreation development.
- C. One small peninsula on the site juts into the cove almost forming an island.
- D. Most of the site is heavily wooded.

III. Existing Facilities

- A. The area has an overused launch ramp (2 lanes) with 32 car/trailer parking spaces.
- B. A small picnic area contains five picnic units and a shelter with three tables.
- C. There are 44 existing Class B campsites at Longwood.
- D. All existing facilities are heavily used and would be improved by rehabilitation.

IV. Design Intent

- A. This popular area will continue to be heavily used and it is hoped that proposed facilities nearby will ease congestion.
- B. Camping facilities will be expanded to help accommodate heavy demand on this area.

V. Proposed Facilities

- A. All existing recreation facilities will be rehabilitated.
- B. Twenty-five Class A campsites are proposed for the undeveloped portion of the area (to be cost shared).
- C. Shoreline protection measures will be initiated on approximately 150 yards of shoreline on the site.
- D. The parking area associated with the existing boat launch will be enlarged.
- E. A one lane boat launch will be added to the camping area to serve overnight users. No parking will be associated with this launch.

BUFFALO (34)
PLATE 7-10

I. General Description

- A. The Buffalo Public Use Area contains approximately 24 acres.
- B. It is located about three miles north of U.S. Highway 58 at the end of Virginia State Road 722.
- C. The site is a point at the confluence of Buffalo Creek and the main reservoir.

II. Site Analysis

- A. The area is a moderately sloped hillside.
- B. Vegetation on the site is a healthy and vigorous pine stand.
- C. The existing boat launch area was formed by fill and has a rip-rap shoreline.
- D. The area has a dramatic 270° view from the extreme point.

III. Existing Facilities

- A. Buffalo Public Use Area is currently used for camping, picnicking, and boat launching.
- B. The two lane boat launch area is built on fill and has parking for 18 car/trailers.
- C. Seventeen picnic units are existing in two areas.
- D. The area has 15 existing Class B camp units.
- E. All existing facilities are heavily used and would benefit from rehabilitation.

IV. Design Intent

- A. There are presently conflicts between day use and overnight use of the area. To alleviate this the camping area will be converted to day use.
- B. Prior to conversion to day use, the camp area at Buffalo will be operated on a non-fee basis.

V. Proposed Facilities

- A. All existing facilities will be rehabilitated except for the 15 camp units which will be relocated to Longwood.
- B. Ten additional picnic units will be developed in the existing camping area.
- C. A new picnic area will be developed on the site of the relocated campground. This area will contain 25 picnic units and be cost shared with an eligible sponsor.

TAILRACE ACCESS AREA (55)
PLATE 7-10

I. General Description

- A. This small area contains about 25 acres.
- B. It is located immediately below the dam on the north shore.
- C. It is a popular area for fishermen.

II. Site Analysis

- A. The area is limited for intensive development by poor soils.
- B. The shoreline of the site is eroding from constant water fluctuations.
- C. The existing boat launch is heavily used despite being unimproved.

III. Existing Facilities

- A. An unimproved boat ramp and fishing platforms are located at the area.
- B. A picnic shelter and flush toilet facilities have recently been added to the area.

IV. Proposed Facilities

- A. The boat ramp will be improved and parking will be provided for cars and trailers.
- B. A small (10 units) day use area will be developed on the site (to be cost shared).
- C. Play equipment will be included in the development of the day use area.
- D. Additional parking will be provided for the bank fishing area.

BLUESTONE LANDING (40)
PLATE 7-11

I. General Description

- A. This small area contains about 12 acres.
- B. It is located at the U.S. Highway 15 crossing of Bluestone Creek.
- C. It serves as a boat access area.

II. Site Analysis

- A. This site is located on a major transportation corridor on the project.
- B. It is a flat, fill area created for the purpose of access.

III. Existing Facilities

- A. A two lane boat launch with 45 car/trailer parking spaces is located on the site.
- B. Six picnic units are also located here.

IV. Proposed Facilities

- A. It is proposed that the area be retained for boat access to the reservoir.
- B. The picnic units will be eliminated and relocated to Clarksville Overlook.
- C. One new boat launch lane will be added to this site under a cost sharing arrangement.

RUDD'S CREEK (47)
PLATE 7-11

I. General Description

- A. This area is located 3 miles west of Boynton, Virginia, on U.S. Highway 58.
- B. The area contains approximately 100 acres.
- C. The recreation area is divided by Highway 58 with camping located on the south side and day use and boat launching on the north.

II. Site Analysis

- A. The area is located so as to absorb a high volume of use.
- B. The site is gently rolling with few limitations to development.
- C. The site is nearly developed to capacity.
- D. Highway 58 is planned for widening in this area which will eliminate one existing day use area.

III. Existing Facilities

- A. The site has 103 existing Class B camp units located in two areas.
- B. A small beach is located in one campground.
- C. A three lane boat launch is located on the site with parking for 53 car/trailers.
- D. A camp area containing 15 Class B units is located adjacent to the boat launch.
- E. A 15 unit picnic area is located adjacent to Highway 58 on the south side of the highway.
- F. All existing facilities are heavily used and should be rehabilitated.

IV. Design Intent

- A. The area is well suited to its present use and should remain essentially the same.

V. Proposed Facilities

- A. Fifteen picnic units will be eliminated by the Highway 58 expansion and these should be relocated to replace the camping area on the north side of Highway 58.
- B. All existing facilities will be rehabilitated.
- C. Twenty-two additional car/trailer parking spaces are proposed to accommodate the high volume of users at the Rudd's Creek boat launch.
- D. The existing camping units north of Highway 58 will be relocated to the south side.

- E. An additional 25 Class B camp units will be developed south of the present area boundary.
- F. One boat launch lane with no parking is proposed to serve the existing camp area.

EASTLAND CREEK LANDING (52)
PLATE 7-11

I. General Description

- A. Eastland Creek Landing contains approximately 119 acres.
- B. The site is located on the east shore of Eastland Creek at the end of Virginia State Road 824.

II. Site Analysis

- A. An electric powerline cuts across the site.
- B. Access is available to half the site and a right-of-way would have to be acquired to get access to the other half.
- C. Shoreline erosion is evident on the developed portions of the site.
- D. There are limitations for development due to excessive slopes on much of the undeveloped portion of the area.

III. Existing Facilities

- A. The site presently is developed for camping, day use, and boat launching.
- B. Twenty-eight Class B camp units are located on one peninsula.
- C. The site contains a small day use area with five picnic units.
- D. The existing boat launch area has a two lane ramp and parking for 17 car/trailers.
- E. The area is heavily used and most existing facilities are in need of rehabilitation.

IV. Design Intent

- A. The area is proposed for use as a boat access area and for a group camp.
- B. Elimination of existing camping will relieve conflicts between day use and overnight use of the site.

V. Proposed Facilities

- A. The existing camping area will be relocated and a reserve group camp area will be built on the former campground.
- B. The existing day use area will be rehabilitated.
- C. Of the twenty-eight relocated camping units, twenty-five will be allocated to Rudd's Creek and three to Longwood.
- D. Shoreline protection measures will be implemented on approximately 100 yards of the eroded area.

EAGLE POINT LANDING (49)
PLATE 7-13

I. General Description

- A. This site consists of two narrow peninsulas located on the north shore of the reservoir.
- B. The area contains approximately 123 acres.
- C. The site is located at the end of Virginia State Road 705.

II. Site Analysis

- A. The site is two narrow peninsulas with steep shorelines.
- B. Suitable land for development is located up on the ridges but access to the shoreline is poor.
- C. The Archaeological Survey identified significant prehistoric archaeologic sites at this area.

III. Existing Facilities

- A. The site contains an existing two lane boat launch with 30 car/trailer parking spaces.

IV. Design Intent

- A. The area will continue to be used for boat launching.
- B. No additional development is proposed in order to protect the archaeologic sites located in this area.

V. Proposed Facilities

- A. The boat launch will be rehabilitated.

NORTH BEND PARK AND MARINA (54)
PLATES 7-12 and 7-13

I. General Description

- A. This area is the largest Corps of Engineers operated recreation area on the reservoir.
- B. The area is a linear park along the north shore of the reservoir beginning at the dam.
- C. The park contains 409 acres.

II. Site Analysis

- A. The park consists of several peninsulas of varying sizes.
- B. The larger points are experiencing shoreline erosion on their west banks.
- C. The major COE maintenance compound for the reservoir is located here.
- D. An existing marina is operated by a concessionaire.
- E. The entire park is heavily used and very much in need of rehabilitation.

III. Existing Facilities

- A. North Bend Park is currently developed with the following major facilities:

- 245 Campsites
- 67 Picnic Units
- 1 Small Group Camp
- 5 Boat Launch Lanes
- 3 Picnic Shelters
- 6 Beach Areas
- 1 Large Amphitheater
- 1 Small Marina

- B. All facilities are heavily used and need rehabilitation.

IV. Design Intent

- A. As the major COE recreation development, this area is the focal point for visitors to the reservoir.
- B. The park should be a showplace of good recreation planning and design.
- C. The westernmost peninsula of the park is accessible only through a large residential area. This area should not be developed because of the conflicts that would be created.

V. Proposed Facilities

- A. A visitor's center with an interpretive program will be developed adjacent to the park.

- B. It is proposed that the marina operator add a camping area to his lease and develop it for a more intensive use.
- C. The marina should be developed into a more sophisticated facility either by the present concessionaire or by a new party.
- D. A small day use area (7 units) will be developed on the small point north of the proposed visitor's center.
- E. Shoreline protection structures will be built on approximately 500 yards of shoreline where erosion has been severe.
- F. All existing facilities will be rehabilitated as needed.

CLARKSVILLE OVERLOOK (66)
PLATE 7-14

I. General Description

- A. This area is located at the junction of U.S. Highways 15 and 58.
- B. It is directly across the reservoir from the Town of Clarksville, Virginia.
- C. This small area contains approximately 5 acres.

II. Site Analysis

- A. The site is adjacent to a busy and potentially dangerous road intersection.
- B. The shoreline of the area is severely eroded.

III. Existing Facilities

- A. The only existing facility at Clarksville Overlook is a bulletin board displaying COE regulations.

IV. Design Intent

- A. The area will be developed as a boat launch and day use area.
- B. It is anticipated that primary use will come from Clarksville.
- C. The intersection of Highways 15 and 58 have to be redesigned to control access to this site.

V. Proposed Facilities

- A. A two lane boat launch will be developed on the site.
- B. A picnic shelter with six tables will be located adjacent to the boat launch.

B. AREAS OPERATED BY OTHERS
KIMBALL POINT (4)
PLATE 7-15

I. General Description

- A. This long, narrow peninsula contains approximately 80 acres.
- B. Kimball Point is located on the east side of Nutbush Creek immediately south of the Virginia/North Carolina State Line.
- C. Access to the area is from North Carolina State Road 1204.

II. Site Analysis

- A. The area is flat and subject to periodic flooding.
- B. Soils are a limiting factor to intensive development on about half the site.
- C. The area is developed to almost full capacity.
- D. Vegetation at Kimball Point is almost exclusively pines.

III. Existing Facilities

- A. Kimball Point Recreation Area is operated by the State of North Carolina.
- B. The site has 98 Class B camp units in two areas.
- C. A small day use area on the site contains eight picnic units and a small shelter.
- D. The area also contains a one lane boat launch and a large beach.
- E. There is potential at the area for conflicts between day and overnight use.

IV. Design Intent

- A. The area is quite popular, particularly for camping and swimming.
- B. The area should continue to serve these same functions while upgrading existing camping facilities.
- C. The area will be developed as an exclusively overnight use area.

V. Proposed Facilities

- A. Two group camping areas are proposed for Kimball Point.
- B. The existing day use area will be eliminated and the site will be utilized for one of the group camp areas.
- C. The existing boat launch will be utilized by campers only.
- D. All existing facilities at Kimball Point will be rehabilitated and approximately 3,000 yards of shoreline will be stabilized.

HENDERSON POINT (16)
PLATE 7-15

I. General Description

- A. This large area of approximately 329 acres is located on the west shore of Nutbush Creek.
- B. N. C. State Route 1359 terminates on the site.
- C. The site is the point and southern shore of a long peninsula.

II. Site Analysis

- A. The buildable areas on the site are a series of small points along the south side of the peninsula.
- B. This shape allows the physical separation of uses which allows greater control of potential conflicts.
- C. A significant archaeological site has been located on the point of the peninsula.
- D. The view from the point looking south down Nutbush Creek is quite scenic.
- E. The point is covered with dense pine stands.

III. Existing Facilities

- A. The site is currently developed for both day and overnight use with good separation of facilities.
- B. The existing day use area contains 14 picnic units, one picnic shelter, and a one lane boat launch.
- C. Two camping areas contain a total of 84 Class B units.
- D. An existing boat launch area contains two launch lanes.

IV. Design Intent

- A. The site can continue to effectively accommodate both day use and overnight use.

V. Proposed Facilities

- A. The existing day use area will be expanded by the addition of 30 picnic units.
- B. A reserved day use area will be developed for use by groups.
- C. All existing facilities at Henderson Point will be rehabilitated.

COUNTY LINE PARK (5)
PLATE 7-16

I. General Description

- A. County Line Park contains 225 acres.
- B. N. C. State Routes 1361 and 1242 both terminate on the site.
- C. The site contains three physically separated points of land.

II. Site Analysis

- A. Much of the site is a narrow strip of land along the shoreline.
- B. Limitations for intensive development due to slope occur on approximately 20% of the site.
- C. The conformation of the shoreline is quite flat causing many facilities to be unusable in times of high water.
- D. The site is heavily wooded, predominantly with a mixed pine/hardwood forest.

III. Existing Facilities

- A. County Line Park is operated by the State of North Carolina.
- B. Eighty-five Class B camp units are located in two camping areas on the site.
- C. An existing day use area contains ten picnic units and one shelter.
- D. There is an existing boat launch with two launch lanes located adjacent to the day use area.

IV. Design Intent

- A. The area is suitable for both day use and overnight use but control must be developed to avoid potential conflicts.
- B. The western peninsula is as yet undeveloped but is suitable for development as an additional camping area.

V. Proposed Facilities

- A. Additional land should be acquired to make the park more manageable.
- B. Rental cabins will be built in two areas on the western peninsula of the site.
- C. One existing Class B camping area will be eliminated and a new 50 unit Class A campground will be developed.
- D. Rehabilitation at County Line Park will include all existing recreation facilities and shoreline stabilization on approximately 6,500 yards of shoreline.

BULLOCKSVILLE PARK (8)
PLATE 7-17

I. General Description

- A. This park is located at the end of N. C. State Route 1366 just north of Satterwhite Point.
- B. This large area contains 455 acres.
- C. A very limited area on this site has been developed.

II. Site Analysis

- A. The area has rolling topography with some limitations for development due to slope.
- B. There is severe shoreline erosion along almost one mile of the developed portion of this site.
- C. The area is heavily wooded with a variety of vegetation types.

III. Existing Facilities

- A. There is a use conflict between the present day use and camping areas because there is no control of access between them.
- B. The existing day use area contains 42 picnic units and two large shelters.
- C. An existing camping area contains 69 Class B camp units.
- D. There is an existing one lane boat launch located on the site.
- E. A small snack bar on the site is operated by a concessionaire.

IV. Design Intent

- A. All existing facilities at the park are heavily used and should be continued.
- B. Control has to be established between potentially conflicting uses.
- C. The State of North Carolina has proposed expansion of this area to the north of the present boundaries to include Class A camping, group camping, and rental cabins.

V. Proposed Facilities

- A. The existing camping area will be eliminated and a day use area will be developed on the site in order to eliminate the existing conflict between the areas.
- B. Four new camping areas will be developed with a total of 60 Class A units, 40 Class B units, and a small group camp area.
- C. Additional land should be acquired to make this area more manageable.
- D. A ranger's residence is proposed for this area.
- E. Proposed development for the expansion of Bullocksville Park is shown on Figure 7-01.
- F. All existing facilities at Bullocksville Park will be rehabilitated.

CABIN COMPLEX
30 CABINS

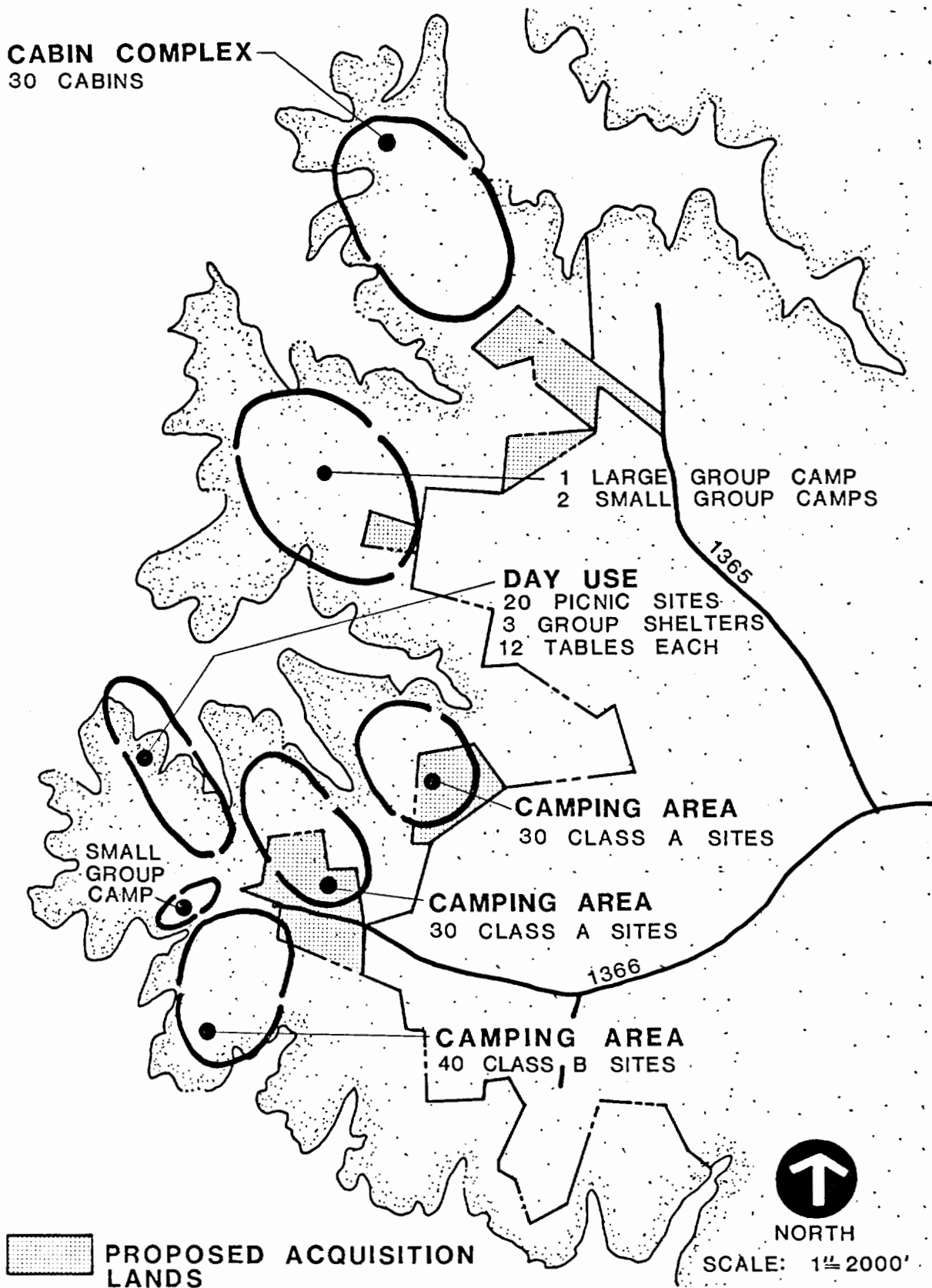


FIGURE 7-01

PROPOSED DEVELOPMENT FOR THE EXPANSION OF
BULLOCKSVILLE PARK

FLEMINGTOWN ROAD MARINA (9)
(Meekin's Marina)
PLATE 7-18

I. General Description

- A. This site contains 73 acres.
- B. The area is located on Mill Creek which flows into the southern part of Nutbush Creek.
- C. The area is located at the end of N. C. State Route 1371.
- D. This area is operated under a sublease from the State of North Carolina.

II. Site Analysis

- A. The site is flat and has no constraints to development.
- B. Existing pine vegetation has been seriously degraded by trampling.
- C. Mobile homes which are located on the site will be removed by October of 1980.

III. Existing Development

- A. The marina development contains 27 covered slips, 40 moorings, a maintenance and sales building and a gas dock.
- B. A camping area contains 10 Class A camp units and 65 Class B units.
- C. The area also contains a boat launch and overflow camping area.

IV. Proposed Facilities

- A. The marina is a very poor facility which is very much in need of rehabilitation.
- B. The mobile homes on the site will be removed by October 1980.
- C. The day use area will be expanded into the area vacated by the removal of the mobile homes.

CLARKSVILLE MARINA (32)
PLATE 7-18

I. General Description

- A. This private concession represents the most sophisticated marina facility on the reservoir.
- B. The site contains approximately six acres of land.
- C. It is located in the Town of Clarksville on Crowder's Branch Creek and is operated under a sublease from the town.

II. Site Analysis

- A. The buildable portions of the site have been developed.
- B. The undeveloped portion of the site is a steep shoreline and mostly below the five year flood pool.
- C. Expansion of land based facilities would require the addition of fill along the shoreline.

III. Existing Facilities

- A. Mooring facilities include 60 open slips, 7 covered slips, and 38 mooring buoys.
- B. Other facilities include a gas dock, marine supply store, service building, and an office.
- C. A one lane boat launch on the site is available for public use.
- D. The existing facilities are heavily used and well maintained.
- E. A lack of parking space is a major problem at the marina largely due to public use of the boat launch.

IV. Design Intent

- A. The marina operator should be encouraged to expand his facility because of high demand on the project for marina facilities.
- B. The boat launch should be closed to public use and be left for use by those utilizing the marina only.
- C. A new ramp for public use should be constructed at Clarksville Overlook.

V. Proposed Facilities

- A. Thirty-five to forty open slips will be added next to the existing boat launch.
- B. Fifty covered slips and additional parking are proposed for the northern portion of the lease.
- C. It is proposed that the operator be allowed to build a retaining wall and fill behind it to create additional parking in the existing area.

SATTERWHITE POINT PARK (10)
PLATE 7-19

I. General Description

- A. Satterwhite Point Park contains 390 acres, much of it under lease to a marina concessionaire.
- B. The area is a long, broad peninsula bounded by Nutbush Creek and Anderson Swamp Creek.
- C. The park is located at the northern terminus of N. C. State Route 1319.

II. Site Analysis

- A. Satterwhite Point Park has the highest concentration of recreation facilities on the reservoir.
- B. The area is heavily used and many facilities are in need of rehabilitation.
- C. The end of the peninsula is a very important historic site which might have interpretive value.
- D. Richard Henderson's grave is located on the site and must be protected.
- E. The site is developed to capacity except for some of the land leased to the marina.

III. Existing Facilities

- A. Tar Heel Marina
 - 1. Tar Heel Marina has leased all the property of the site east of Route 1319 up to the marina itself.
 - 2. The marina has excellent maintenance facilities but the mooring facilities need improvement.
 - 3. The marina development contains the following facilities:
 - a) One two lane boat launch
 - b) 4 open slips
 - c) 20 covered slips
 - d) 150 moorings
 - e) 200 dry storage spaces
 - f) sales and maintenance building
 - g) service dock
 - h) snack bar
 - 4. The marina operator has also developed two camping areas. One area contains 34 Class B units, the second area is a group camping area with 10 Class B units.
- B. State of North Carolina Development
 - 1. North Carolina's Kerr Lake State Recreation Area headquarters and maintenance center are located on this site.
 - 2. The site contains two day use areas with a total of 22 picnic units and 5 large shelters which each contain 6 tables.

3. There is a two lane boat launch located in one of the day use areas.
4. The park contains two camping areas with a total of 11 Class A camp units and 104 Class B units.
5. A one lane boat launch is located in the larger camping area.

IV. Design Intent

- A. The area has interpretive value for its historic features. These should be investigated in more detail.
- B. The marina operator should be encouraged to develop a more sophisticated facility to handle the demand for facilities.
- C. The State should reacquire the land leased to the marina operator other than that used for the marina itself. The State will take over the operation of the existing campground in this area.
- D. All existing facilities should be considered for rehabilitation.

V. Proposed Facilities

- A. Additional land should be acquired to make this area more manageable.
- B. A camping area with twenty Class A units will be developed in this new parcel.
- C. All existing recreation facilities at Satterwhite Point will be rehabilitated including the marina and approximately 4,300 yards of shoreline.

NUTBUSH CREEK RECREATION AREA (11)
PLATE 7-20

I. General Description

- A. This area contains 363 acres.
- B. It is located at the south end of Nutbush Creek where Flat Creek and Crooked Run Creek flow into Nutbush.
- C. The area is adjacent to N. C. State Route 1308 and N. C. State Highway 39.

II. Site Analysis

- A. The site is heavily wooded except for some large grass areas. About half the vegetation is upland hardwoods and the other half is mixed pine/hardwood.
- B. The topography of the area is gently rolling hills with small areas with development restrictions due to the slope.
- C. The area is the closest recreation area to the City of Henderson, North Carolina, the major regional population center.

III. Existing Facilities

- A. The area is presently developed for both day and overnight use.
- B. Three camping areas contain a total of 28 Class A units and 50 Class B camp units.
- C. An existing day use area contains a one lane boat launch and a picnic shelter with six tables.

IV. Design Intent

- A. Day use at Nutbush will be eliminated to exclusively allow overnight use of the area.
- B. It is intended that future development be limited to protect the large open areas which give Nutbush its character.

V. Proposed Facilities

- A. The existing day use area will be eliminated but the boat launch ramp will remain.
- B. A small group camp area will be developed on the site of the eliminated day use area.
- C. Rehabilitation of existing facilities is a high priority at this area.
- D. A group camp area and boat ramp will be developed in the future.

WILLIAMSBORO WAYSIDE (12)
PLATE 7-20

I. General Description

- A. This area contains about 33 acres.
- B. The site is located adjacent to N. C. State Highway 39 near the south end of Nutbush Creek.
- C. The area is leased to the State of North Carolina.

II. Site Analysis

- A. The location of this small area is suitable for providing boat access to the reservoir.
- B. The area is presently used informally for access.
- C. The site has no development constraints.

III. Design Intent

- A. This area will provide access to the reservoir for local boaters, most coming from Henderson and surrounding rural areas.

IV. Proposed Facilities

- A. A two lane boat launch will be built on this site.
- B. With the development of the boat launch, management of this area will shift from the N. C. Division of Parks and Recreation to the Wildlife Commission.

TOWNSVILLE LANDING AND MARINA (14A, B)
PLATE 7-21

I. General Description

- A. This 382 acre area is located two miles southeast of Townsville on N. C. State Route 1346.
- B. The area is under lease to the State of North Carolina which in turn subleases about 25 acres to a marina concessionaire.
- C. The site is essentially two points of land bisected by a narrow cove.

II. Site Analysis

- A. The shoreline of the area slopes quite gradually creating very shallow water for good distance offshore and broad mudflats when the water level is low.
- B. The area is covered with diverse vegetation, mostly pines and hardwoods.
- C. The site has high visual quality.

III. Existing Facilities

- A. The existing marina concession contains a boat ramp, picnic facilities, 10 Class A camp units, and mooring facilities.
- B. Roads and a two lane boat launch have been added into the area presently under construction by the state.

IV. Design Intent

- A. Townsville Landing will be developed as a major recreation facility for both day and overnight use.
- B. The marina operator will be encouraged to move his concession to the Hibernia Recreation Area because of its more suitable location.
- C. Trailers now located at this site will be moved by October 1980.

V. Proposed Facilities

- A. A day use area will be developed on the southern peninsula containing 50 picnic units and two shelters with twelve tables in each.
- B. The existing marina facility will be relocated to Hibernia, but the boat launch will remain for use by day visitors.
- C. The northern peninsula will be developed for overnight use with 190 Class B camp units.
- D. An intersite trail of approximately 3.6 miles will be built connecting Townsville Landing to Hibernia to the north.
- E. The boat launch will be rehabilitated and 3,800 yards of shoreline will be stabilized.

HIBERNIA RECREATION AREA (15)
PLATE 7-22

I. General Description

- A. The Hibernia area contains 446 acres.
- B. It is located on the west side of Nutbush Creek at the terminus of North Carolina State Route 1347.
- C. The area consists of two small points and a large peninsula.
- D. The area is operated by the State of North Carolina.

II. Site Analysis

- A. The area has a gradual slope along the shoreline and many existing facilities near the water are flooded when the water level is high.
- B. The shape of the shoreline is quite complex, with numerous small coves.
- C. The area is densely developed, leaving only small pockets for new development.

III. Existing Facilities

- A. Hibernia is presently used for both day and overnight use with little control over the mix of uses. This can lead to use conflicts.
- B. Two boat launch areas contain two lanes each.
- C. Three existing camp areas contain a total of 30 Class A units and 120 Class B camp units.
- D. One group use area contains 15 Class B units.
- E. Three day use areas contain a total of 91 picnic units, one shelter, and a large beach area.
- F. An administrative area on the site contains a ranger residence, storage, and a workshop.

IV. Design Intent

- A. The area will be designed to accommodate a wide variety of uses.
- B. A marina concession will be developed at Hibernia.

V. Proposed Facilities

- A. The State should acquire two additional parcels for future expansion and to make the area more manageable.
- B. A Cabin Complex with fifty rental cabins will be developed at Hibernia.
- C. It is proposed that the marina development at Townsville Landing be relocated to this area.

- D. One existing camp area at Hibernia will be eliminated and a day use area will be developed on a portion of the same site.
- E. A trail of approximately 3.6 miles will be built to connect Townsville Landing and Hibernia.
- F. All existing recreation facilities at Hibernia will be rehabilitated.

OCCONEECHEE STATE PARK (43A, B, C, D)
PLATES 7-23, 24, 25

I. General Description

- A. Occoneechee State Park is the largest recreation area on the reservoir containing approximately 2,690 acres.
- B. The park is located on the north side of the reservoir directly northeast of Clarksville.
- C. The area is operated by the Commonwealth of Virginia.
- D. The developed portion of the park contains 564 acres.
- E. The undeveloped portion is the 2,126 acre Panhandle Peninsula.
- F. The following site description deals with the two areas separately.

DEVELOPED AREA

I. Site Analysis

- A. The area is steeply rolling hills and much of the area has limitations for intensive development due to excessive slopes.
- B. The shoreline of the park has a very complex shape with numerous small coves providing almost six miles of water frontage on the developed portion of the site.
- C. Vegetation on the site is predominately upland hardwoods although there are also large stands of mixed pine/hardwood forest.

II. Existing Facilities

- A. Existing development at Occoneechee State Park is primarily for overnight use.
- B. Three camping areas at the park contain a total of 15 Class A camp units and 135 Class B units.
- C. Two existing day use areas contain 18 picnic units and two picnic shelters.
- D. Two boat launches exist at the park, one having one lane and one with two lanes.

III. Design Intent

- A. The developed portion of the site contains some very fine camping areas which are heavily used.
- B. The day use facilities should be more strongly developed to accommodate the high present and future demand for these activities.

IV. Proposed Facilities

- A. The Commonwealth of Virginia has not developed plans for future

development of Occoneechee State Park. The Commonwealth has developed goals for future facility development. Ultimate development at Occoneechee State Park is expected to include the addition of the following facilities:

- One new picnic area
- One swimming pool (400 people)
- 42 parking spaces at boat launch areas
- 87 parking spaces in other areas
- 86 camping units in two areas
- One visitors center
- 60 primitive camp units

UNDEVELOPED AREA

I. Site Analysis

A. Positive Site Features

1. The complex topography and high elevations on the peninsula allow the most dramatic water vistas found at the reservoir.
2. The area is covered with a healthy upland hardwood forest.
3. Existing trails provide hiking access to most of the peninsula.
4. Visual quality on the site is high.
5. The entire peninsula is a high quality wildlife habitat.

B. Negative Site Features

1. The shoreline along the peninsula is quite steep and erosion is severe in many places.
2. The area is too isolated and topography too severe for intensive development.

II. Design Intent

- A. The area is intended for extensive use by hikers and boat in campers.
- B. It is anticipated that the area will be developed by the State of Virginia as a "wilderness" unit of Occoneechee State Park.

III. Proposed Facilities

- A. Three primitive camp areas of 20 units each are proposed for the undeveloped area of Occoneechee State Park.
- B. See Proposed Facility note for developed portion of Occoneechee State Park.

HYCO LANDING (57)
PLATE 7-26

I. General Description

- A. This small access area contains six acres.
- B. The site is located on the Hyco River at the U.S. Highway 58 crossing.

II. Site Analysis

- A. The site floods frequently limiting its use in periods of high water.
- B. The area has soils limitations for intensive development over the entire site.

III. Existing Facilities

- A. The area is developed for boat access with one boat launch.
- B. The site is operated by the Virginia Commission of Game and Inland Fisheries.

IV. Proposed Facilities

- A. No additional facilities are proposed for this area.

CLOVER LANDING (61)
PLATE 7-26

I. General Description

- A. This small boat access area is located on the Roanoke River at the U.S. Highway 360 crossing.
- B. The site contains 5 acres.

II. Site Analysis

- A. The site is located in the floodplain of the Roanoke River.
- B. The site is almost completely cleared for a gravel parking area.

III. Existing Facilities

- A. The area is presently developed for boat access with a boat launch.
- B. The site is operated by the Virginia Commission of Game and Inland Fisheries.

IV. Proposed Facilities

- A. No additional facilities are proposed for this site.

C. QUASI-PUBLIC LEASE SITES
LAKESIDE CAMPING & SPORTS CLUB (14-Q)
PLATE 7-27

I. General Description

- A. The Lakeside Camping and Sports Club consists of 2 acres and is the only private club lease area at the reservoir.
- B. It is located on the Nutbush Creek arm of the reservoir south of County Line Park.
- C. Access to the site is achieved via a private road from North Carolina Secondary Road 1363.

II. Site Analysis

- A. The site is relatively level with no severe slopes.
- B. The site is wooded and of excellent aesthetic value.

III. Existing Facilities

- A. The site has 21 Class A campsites.
- B. Water-oriented facilities include a boat dock and a one-lane boat ramp.
- C. No new facility development is planned by the lease holder.
- D. Although the area has not been abused, maintenance has been sub-standard and should be improved.

UNIVERSITY OF NORTH CAROLINA (37-Q)
PLATE 7-27

I. General Description

- A. The site is composed of approximately 217 acres.
- B. The University of North Carolina lease area is located at the confluence of Dodson Creek and the Nutbush Creek arm of the reservoir approximately 5 miles northeast of Townsville.
- C. North Carolina State Road 1358 terminates on the site.

II. Site Analysis

- A. The site contains three vegetation cover types: mixed pine/hardwood stands, old fields, and upland hardwood stands.
- B. Moderate slopes occur along the lakeshore.
- C. There are no severe soil limitations on the site.

III. Existing Facilities

- A. Three camping areas are on the southern side of the site with a total of 29 Class B units.
- B. There are three day use areas with a total of 2 shelters with 2 tables each, 30 additional picnic units, pit toilets and a water well.
- C. A 50' x 25' beach is located at the day use area on the southern side of the site, and 100' x 25' beach is located at the day use area on the point.
- D. Water oriented facilities include a boat launch area on both the northern and southern side of the site, 2 boat docks, and boat storage.
- E. Other facilities include a residence trailer and a storage area for camping trailers.

IV. Design Intent

- A. Increase the camping capacity of the lease site.

V. Proposed Facilities

- A. Two non-reserved camping areas with a total of 13 camping units.
- B. Additional proposed facilities not shown on orthophotograph include reserved camping areas, boat docks and swimming docks.

NORTH STATE BOATING CLUB (42B-Q)
PLATE 7-27

I. General Description

- A. The North State Boating Club site contains approximately 22 acres.
- B. The site is located on Mill Creek, off of the main arm of the reservoir approximately 9 miles upstream from the dam.
- C. Access to the site is achieved by private road from Virginia State Road 826.

II. Site Analysis

- A. The site is wooded but has two large, open fields.
- B. The large proportion of land with slope of 8 to 16 percent limit potential development.
- C. Slopes along the shoreline are very steep.
- D. No facilities exist at this site and the North State Boating Club has relinquished its lease.
- E. Access to the site from Virginia State Road 826 is across private land and is very difficult.
- F. Due to limited developable land and poor access, it is recommended that this site not be leased in the future.

N. C. STATE UNIVERSITY (18-Q)
PLATE 7-28

I. General Description

- A. The N. C. State University lease site contains approximately 113 acres.
- B. The site is located on Nutbush Creek approximately one mile northeast of Bullocksville.
- C. Access to the site is difficult over a private farm road from North Carolina Secondary Road 1366.

II. Site Analysis

- A. Most of the site has moderate slopes.
- B. Severe soils limitation exist on over half of the site.
- C. The site is located in a cove of the reservoir.
- D. Vegetation cover is generally mixed pine/hardwood.
- E. A small portion of the area is in agricultural use.

III. Existing Facilities

- A. There are no facilities at the site.
- B. Due to poor access, limited developable land, and lack of existing development, continued use of the area as a lease site is not recommended.

IV. Design Intent

- A. The lease for this area has been cancelled.
- B. The State of North Carolina has expressed interest in leasing and developing this area as an extension of Bullocksville Park. When this is done the area should be upgraded to an intensive recreation classification.

FORT BRAGG (46-Q)
PLATE 7-28

I. General Description

- A. The Fort Bragg lease area contains approximately 23 acres.
- B. The site is located on the south shore of the reservoir on Mill Creek, approximately 9.5 miles upstream of the dam.
- C. Virginia State Road 746 provides access to the site.

II. Site Analysis

- A. Moderate and severe slopes are extensive on the site.
- B. A well defined area of slight slopes traverses the length of the peninsula.
- C. A stand of old oaks is located in the center of the area.
- D. Pines cover the remainder of the area.
- E. The site offers excellent views of the reservoir.

III. Existing Facilities

- A. A group camp is located at the site.
- B. The group camp has 10 Class B camp units, 40 Class C camp units, a shelter, pit toilets and water wells.
- C. There is a beach at the site.
- D. The site is inactive.
- E. It is recommended that the site be made available for lease to a qualified quasi-public organization for use as a group camp.

CHEROKEE B.S.A. (49A-Q)
PLATE 7-28

I. General Description

- A. The Cherokee B.S.A. lease site occupies 161 acres.
- B. The site is located on Grassy Creek adjacent to and east of, the U.S. Highway 15 bridge.
- C. Access to the site is provided by U.S. Highway 15.

II. Site Analysis

- A. Slopes on the site are slight to moderate.
- B. Much of the site is isolated by high water.
- C. A heavy, dense pine stand covers the area.
- D. Facilities are located on a peninsula frequently isolated by high water.
- E. Soil limitations are severe on the land bridge connecting the peninsula point with the mainland.
- F. The facilities are located in an area of high visual quality due to excellent vegetation cover, lake views, and topography.

III. Existing Facilities

- A. Group camp facilities include 8 cabins, 4 Class C camp units, a dining hall, a storage building, sanitary facilities and a water supply.
- B. Water oriented facilities include a 100' x 50' beach and a boat dock.
- C. Facilities are in various states of disrepair, but the site is in good condition and has been well cared for.
- D. No additions are planned for the site by the lease holder.
- E. It is recommended that the lease holder be encouraged to increase facility maintenance at the site.

R. E. LEE BOY SCOUTS (64C-Q)
PLATE 7-28

I. General Description

- A. The R. E. Lee Boy Scout lease area occupies 228 acres.
- B. The peninsula is on the north shore of the reservoir adjacent to Eagle Point Landing.
- C. Virginia State Road 705 provides access to the site.

II. Site Analysis

- A. Moderate to severe slope limitations extend throughout the site.
- B. Areas of slight slope limitations are limited to a few compact ridgetop areas.
- C. Pine bark beetle damage is extensive on the western side of the site.
- D. Nice upland hardwood stands are located in the eastern portions of the site.
- E. Shoreline erosion is extensive on the southwestern side of the peninsula.

III. Existing Facilities

- A. The area is used for primitive group camping.
- B. Facilities are limited to a shelter with 3 tables, a picnic unit, water, pit toilets, and a beach.
- C. The lease holder does not plan any new development.
- D. The site will be maintained as a primitive camping area.

METHODIST BOARD OF EDUCATION (19A-Q)
PLATE 7-29

I. General Description

- A. The Methodist Board of Education lease site occupies 57 acres.
- B. The site is located on a peninsula between Anderson Creek and Mill Creek approximately 7 miles north of Henderson.
- C. A paved road provides access from North Carolina State Secondary Road 1371.

II. Site Analysis

- A. Severe slopes are located on the Anderson Creek shore.
- B. Other areas of the site have slight to moderate slopes.
- C. Site vegetation is open grasses and a mixed pine/hardwood stand.
- D. The site is bounded by agricultural lands.

III. Existing Facilities

- A. The site is used for group camping.
- B. The group camp features 24 Class A camp units, 14 picnic units, a picnic shelter, 7 group camp shelters, a ranger residence, potable water and sanitary facilities.
- C. Water-oriented facilities include a beach, a swimming dock, and a boat launch ramp.

IV. Design Intent

- A. Increase the camping capacity of the site.
- B. Increase the variety of facilities at the site.

V. Proposed Facilities

- A. Twenty-five camping units with hookups are proposed for the area.
- B. Two pavilions are proposed for the area.

PINES OF CAROLINA (19B-Q)
PLATE 7-29

I. General Description

- A. The Pines of Carolina lease area contains approximately 145 acres.
- B. The site is located on the southern shore of the reservoir on Anderson Creek, approximately 7 miles north of Henderson.
- C. A paved road from North Carolina Secondary Road 1371 provides excellent access to the site.

II. Site Analysis

- A. Moderate to steep slopes predominate in the southern half of the site.
- B. Open fields are in the central portion of the site, upland hardwoods are in the southern portion, a mixed pine/hardwood stand in the northern portion, and pure pine stands are interspersed in the upland hardwoods.

III. Existing Facilities

- A. The site is used for organized group activities.
- B. The group camp includes 4 group camp units (144 person capacity, a dining hall, a shop building, 3 storage buildings, 3 staff residences, a ranger residence, hiking trails, sanitary facilities, and water wells.
- C. Water-oriented facilities include a beach, a swimming dock and a boat dock.
- D. No plans for new development have been indicated by the lease holder at this site.

N. C. STATE UNIVERSITY FACULTY (23-Q)
PLATE 7-29

I. General Description

- A. This site occupies 23 acres.
- B. The site is located on Nutbush Creek approximately 6 miles north of Henderson.
- C. Access to the N. C. State University Faculty lease site is achieved from North Carolina State Secondary Road 1382.

II. Site Analysis

- A. Severe slopes cover a large portion of the site.
- B. The entire site has severe soils limitations.
- C. A pine stand covers the majority of the site.
- D. Shoreline erosion is a problem on a portion of the site's western shore.
- E. The site offers good views of the reservoir.
- F. The site has good visual qualities.

III. Existing Facilities

- A. The site is used for primitive group camping and primitive family camping.
- B. The group camping area (also used for family camping) features 4 Class C camp units, a shelter with one table, and 2 picnic units.
- C. The site has a one-lane boat launch ramp.

IV. Design Intent

- A. Increase camping capacity.
- B. Retain primitive character of the site.

V. Proposed Facilities

- A. An additional 2 primitive camping units.
- B. An additional 3 picnic units.

PRESBYTERY OF GRANVILLE (38B-Q)
PLATE 7-29

I. General Description

- A. This quasi-public lease site contains 194 acres.
- B. The site occupies a peninsula near the mouth of Nutbush Creek approximately 5 miles from the dam.
- C. A paved road from Virginia State Road 826 provides access to the site.

II. Site Analysis

- A. The site has gently rolling topography with slight to moderate slopes.
- B. Severe soils are confined to the northern shoreline.
- C. Excellent vegetation is on the site.
- D. The group camps are located in dense pine stands.
- E. A mixed pine/hardwood stand is located in the southwestern portion of the site.
- F. The central portion of the site is open fields.
- G. The area is well maintained.

III. Existing Facilities

- A. Two group camps are on the site.
- B. Combined camping facilities include 20 camp units, 10 platform units, 8 cabins, 2 lodges with cooking facilities and restrooms, 2 dormitories, and potable water.
- C. A large recreation hall is centrally located.
- D. Administrative facilities include 2 residences, 2 storage buildings and an infirmary.
- E. Water-oriented facilities include a boat launch ramp, 1 minor beach, and 2 major beaches, each 120' x 20'.
- F. The lease holder has not indicated plans for additional facilities at the site.

TUSCARORA COUNCIL B.S.A. (41C-Q)
PLATE 7-30

I. General Description

- A. This area contains approximately 295 acres.
- B. The site is located approximately 7 miles upstream of the dam and 6 miles northeast of Townsville.
- C. Access is provided by Virginia State Road 826, a dirt and gravel road.

II. Site Analysis

- A. The site is located on a peninsula.
- B. Broad areas of gentle slopes follow ridgelines on the site.
- C. The site is wooded with pine stands, mixed stands, and upland hardwood stands.
- D. The site has low visual quality due to severe pine bark beetle infestations.
- E. Two areas of shoreline on the site are experiencing erosion due to wind and wave action.

III. Existing Facilities

- A. A group camp area with a capacity of 35 persons has been developed.
- B. The site has 1 major and 1 minor beach.
- C. The site is used for primitive camping.

IV. Design Intent

- A. Increase the group camping capacity of the site.

V. Proposed Facilities

- A. A new group camp area with a capacity of 40 persons is planned.
- B. It is recommended that the lease holder be encouraged to clear pine bark beetle damaged areas.

STATELINE BAPTIST ASSEMBLY (49B-Q)
PLATE 7-31

I. General Description

- A. The Stateline Baptist Assembly lease site is composed of 152 acres.
- B. The site is located on Grassy Creek immediately south of U.S. Highway 15.
- C. Access is achieved from Virginia State Road 721 from U.S. Highway 15.

II. Site Analysis

- A. Moderate (8-16%) slopes are frequent on the south.
- B. Severe slopes (16% +) exist along the shoreline.
- C. Vegetation cover is predominantly upland hardwood with limited areas of pine.
- D. Severe soil limitations are confined to the southern border of the site.
- E. The site has high visual quality.

III. Existing Facilities

- A. Existing facilities are confined to two compact areas.
- B. The day use area in the eastern portion of the site has 4 picnic units, a shelter, and pit toilets.
- C. The group camp area is in an area on moderate to severe slopes.
- D. The group camp area has 8 Class C camp units, 2 shelters, and 2 cabins.
- E. Water related facilities include a major beach.

IV. Design Intent

- A. Existing group camp facilities will be improved.

V. Proposed Facilities

- A. The existing group camp shelters will be enclosed for use as cabins.

VIRGINIA TIDEWATER G.S.A. (49C-Q)
PLATE 7-31

I. General Description

- A. The Virginia Tidewater G.S.A. lease site contains 128 acres.
- B. The peninsula is located on Grassy Creek south of the U.S. Highway 15 bridge, adjacent to Stateline Baptist Assembly.
- C. Virginia State Road 721 provides access to the site from U.S. Highway 15.

II. Site Analysis

- A. Slopes on the point of the peninsula are slight to moderate.
- B. Slopes in the southern portion of the site are severe.
- C. A dense pine stand is located on the peninsula between the group camp and day use area.
- D. A good upland hardwood stand occupies the remainder of the site.
- E. The site has high visual quality.
- F. There are many protected shoreline areas ideal for swimming.

III. Existing Facilities

- A. Facilities are located in one day use area and one group camp area.
- B. The day use area has a shelter and a major beach.
- C. The group camp area has 7 Class C units and a minor beach.
- D. The area is used primarily for primitive camping.

IV. Design Intent

- A. Increase the capacity of the existing group camp.
- B. Retain the primitive nature of the site.

V. Proposed Facilities

- A. The group camp area will be expanded by construction of a shelter (to be enclosed later), tents on platforms, and a troop house.
- B. Development will be staged according to the financial ability of the lease holder.

LYNCHBURG Y.M.C.A. (60-Q)
PLATE 7-31

I. General Description

- A. The site occupies 253 acres of land.
- B. The Lynchburg Y.M.C.A. lease site is on the northern shore of the reservoir between Butcher Creek and Tates Branch and adjacent to Rudds Creek Public Use Area.
- C. Virginia State Road 692 terminates at the site, providing excellent access from U.S. Highway 58.

II. Site Analysis

- A. The site is characterized by rolling topography with slight to moderate slopes.
- B. Mixed pine/hardwood stands and fields are the predominant vegetation types on the site.
- C. Many of the site's fields and pastures are under a separate agricultural lease.
- D. The topography, vegetation and excellent views create a very high degree of visual quality on the site.
- E. There is ample room for additional development.

III. Existing Facilities

- A. The site has a group camp with 6 cabins, a lodge, a dining hall, a recreation hall, a first aid station, and water supply and water tank.
- B. Other facilities include a rifle range, a residence and a stable.
- C. Water oriented facilities include a 250' x 50' beach and a 2-lane boat launch ramp.
- D. Existing facilities have been allowed to deteriorate and have suffered from extensive vandalism.
- E. The lease holder has not indicated any future plans for the area.
- F. It is recommended that the lease not be renewed when it expires on December 31, 1980, and that the area be added to Rudd's Creek Public Use Area for future development by the Corps.

OCCONEECHEE BOY SCOUTS (40-Q)
PLATE 7-32

I. General Description

- A. The Occoneechee Boy Scouts lease site contains 445 acres.
- B. This site is located on the southern shore of the reservoir near Long Grass Branch.
- C. Virginia State Route 826 provides access to the area.

II. Site Analysis

- A. The site is characterized by moderate slopes with steeper slopes near the shoreline.
- B. Upland hardwood and dense pine stands dominate the area.
- C. Pine bark beetles have infested a small area of the site.
- D. The topography, vegetation and good views over the lake create a high degree of visual quality on the site.

III. Existing Facilities

- A. The site contains 10 troop sites with latrines, water, washstands, picnic tables in each site and a central water system. A commissary and storage building are also located at this site.

IV. Design Intent

- A. Increase the capacity of the existing group camp.
- B. Retain the primitive nature of the camp.
- C. Develop the waterfront to provide for aquatic related activities.

V. Proposed Facilities

- A. A new commissary building will be added to the site.
- B. The waterfront should be developed as necessary to provide for the needs of the Boy Scouts.

7-06 PROPOSED RECREATION AREAS

For the purposes of the Master Plan Update the Corps of Engineers provided orthophotograph base maps for thirty-one sites to be considered for future recreation development. These thirty-one areas are shown on the Site Location Map (Plate 4-01). Based on the analysis of natural and cultural resource factors, regional recreation needs, existing recreation facilities, and management considerations, seventeen of these areas have been proposed for recreation use while fourteen areas have been found to be unsuitable for development. The fourteen unsuitable areas have been allocated to Wildlife Management/Forest Reserve. Development proposed for each of the thirty-one sites considered for recreation use is summarized in Table 10-14.

The following outlines for each site include descriptions of location, size, and access for each parcel as well as positive and negative features of each site from the site analysis. Also included are statements of design intent and proposed facilities for each site. All future recreation sites are available for interim forest and wildlife management.

All development proposed in this master plan is in accordance with Executive Order 11990 - Protection of Wet Land.

Index to Proposed Recreation Areas

<u>Site</u>	<u>Site No.</u>	<u>Plate No.</u>	<u>Page</u>
Town View*	42	7-14	172
Butcher's Bay View	45	7-14	173
Future Lease Site	48-Q	7-30	174
South Dike Park	1	7-33	175
Keats Peninsula	3	7-34	176
Piney Grove*	6	7-35	178
Burrough Mill Landing*	7	7-35	179
Duck Island*	22	7-35	180
Buchanan's Woods	28	7-35	181
Nutbush Woods*	13	7-36	182
Walnut Hill	19	7-36	183
Oakleaf Point	44	7-36	184
Long Grass Point	17	7-37	185
Viking Hills Park	35	7-37	186
Berry Hill Shores*	18	7-38	187
Mooreville Woods*	41	7-38	188
Boydton Landing	48	7-38	189
Beaver Woods*	23	7-39	190
Soudan Landing	30	7-39	191
Soudan Village*	24	7-40	192
Garretts Woods	25	7-41	193
Turtle Head Peninsula	27	7-41	194
Sunrise Landing*	31	7-42	195
Holly Grove	46	7-42	196
Staunton River State Park Extension*	37	7-43	197
Bluestone Park	39	7-44	198
Aaron Access Point*	36	7-44	199
Riverdale Access Point*	56	7-44	200
Newman Point	50	7-45	201
Camper's Cove*	51	7-45	202
Inglewood	53	7-45	203

*Areas not proposed for development

TOWN VIEW (42)
PLATE 7-14

I. General Description

- A. This small area contains 17 acres.
- B. It is located immediately across the reservoir from Clarksville.

II. Site Analysis

A. Positive Site Features

- 1. The location of the Town View area is near the junction of the two major local transportation routes.
- 2. Access is readily available from U.S. Highway 15 by way of a residential street.

B. Negative Site Features

- 1. The site is a hillside with slopes too great to support development.

III. Proposed Facilities

No development is proposed at Town View.

BUTCHER'S BAY VIEW (45)
PLATE 7-14

I. General Description

- A. This area encompasses about 268 acres.
- B. It is located on the west shore of Butcher's Creek immediately north of Oakleaf Point.
- C. Access is available over Virginia State Road 828.

II. Site Analysis

- A. Positive Site Features
 - 1. Complex topography and diverse vegetation cover contribute to the visual quality of the site.
 - 2. The area has a very long shoreline due to numerous coves along the shore.
 - 3. The area is easily accessible from U.S. Highway 58, a major local travel route.
- B. Negative Site Features
 - 1. There are small areas of pine beetle infestation scattered throughout the site.
 - 2. Many of the hillsides are too steep to develop.

III. Design Intent

- A. This site could be developed as the overnight use component of the same park as Oakleaf Point.
- B. Location of development will take advantage of existing roads on the site.
- C. Camp areas will be located on the broad, flat ridges of the site.

IV. Proposed Facilities

- A. One hundred camp units will be developed including 25 Class A units and 75 Class B units.
- B. A two lane boat launch will be developed to service the overnight campers using the site.

FUTURE LEASE SITE (48-Q)
PLATE 7-30

I. General Description

- A. This site contains approximately 328 acres.
- B. The site is located at the confluence of the Roanoke River and Island Creek (orthophotograph is incorrectly labeled).
- C. Access to the area is from Virginia State Road 819, a paved road.

II. Site Analysis

- A. There are a variety of vegetation cover types including mixed pine and hardwood stands, dense pine stands, and open fields.
- B. Slopes are steep along many portions of the shoreline, but are moderate to slight elsewhere.
- C. A high voltage powerline bisects the site.
- D. Several old roads and trails are on the site.
- E. Portions of the site are inaccessible during high water.

III. Existing Facilities

- A. There are no existing facilities at this site.
- B. The site is suitable and available for future quasi-public development.

SOUTH DIKE PARK (1)
PLATE 7-33

I. General Description

- A. This site includes approximately 275 acres.
- B. It is located along Virginia State Highway 4 on the east wing dike of the dam.
- C. Access is readily available to this site.
- D. The site consists of two major land masses connected by a wing-dike.

II. Site Analysis

- A. Positive Site Features
 - 1. The site is located adjacent to the dam; a prime location for visitors to the dam.
 - 2. The site features vistas across the water to the dam.
 - 3. The southern land mass provides soils and slopes quite suitable for development.
 - 4. The southern land mass contains an existing field which is protected from prevailing westerly winds.
- B. Negative Site Features
 - 1. Much of the shore is subject to severe wind/wave action.
 - 2. The northern land mass has severe slope restrictions on approximately 40% of the area.
 - 3. The site includes 275 acres; however, developable land is limited to approximately 100 acres.

III. Design Intent

- A. The area is intended primarily for use by visitors to the dam.
- B. The two buildable land areas should be linked by a foot trail.
- C. All facilities should emphasize views of the dam.
- D. The northern land mass should provide an experience of the natural environment which emphasizes the relationship of the dam and the environment.
- E. The southern land mass will provide an area for a roadside rest experience more than for day long picnicking.

IV. Proposed Facilities

- A. The northern area will contain a double loop nature trail with interpretive markers.
- B. Parking will be provided for 20 cars which will serve the trail and fishermen using the tailrace.
- C. The southern area will contain 50 picnic units and associated parking areas and sanitary facilities.

KEATS PENINSULA (3)
PLATE 7-34

I. General Description

- A. This area contains 275 acres.
- B. The area is located approximately 2 miles south of the dam.
- C. There is adequate access to the site. It is bisected by N. C. State Route 1205 and Virginia State Road 716.
- D. The area is a long, broad peninsula and surrounds a parcel of privately owned land.
- E. There is a large cove on the western side of the peninsula.

II. Site Analysis

- A. Positive Site Features
 - 1. The entire peninsula has been identified as high quality wildlife habitat.
 - 2. The cove on the western side is well protected and quite suitable for a marina development.
 - 3. There are three large areas that have mild slopes and good soils.
 - 4. Existing vegetation on the site is attractive and vigorous.
- B. Negative Site Features
 - 1. The privately owned land in the middle of the site could lead to use conflicts.
 - 2. The western part of the peninsula has some areas limited for recreation by slopes and soils.
 - 3. There are several low areas on the site that are flooded when the water level is above normal pool.

III. Design Intent

- A. The protected cove will be developed for a marina to fill part of the need established in the recreation needs analysis.
- B. A camping area will be developed close to the marina to reinforce its development.
- C. A day use area will be developed on the east side of the peninsula.
- D. Wildlife will be intensively managed on the portion of the peninsula not utilized for intensive recreation.
- E. An interpretive trail will explain measures for wildlife management.
- F. The COE should consider acquisition of the private land on the peninsula.

IV. Proposed Facilities

- A. The southern shore of the cove will be developed for a marina.

- B. Fifty Class A and 25 Class B camp units will be developed around the southern and eastern sides of the cove.
- C. An interpretive trail with markers is proposed for the area managed for wildlife.
- D. A 25 unit picnic area is proposed for the area east of the access road.
- E. Site design should study the potential need to construct a groin or breakwater to further protect the cove.

PINEY GROVE (6)
PLATE 7-35

I. General Description

- A. This site contains approximately 62 acres.
- B. The site is located off N. C. State Road 1363 along the eastern side of the Nutbush Creek arm.
- C. The site is a long, narrow peninsula.

II. Site Analysis

- A. Positive Site Features
 - 1. Vegetation on the site consists of attractive pine stands and agricultural fields under lease to private individuals.
 - 2. The site commands a good view of the dam.
- B. Negative Site Features
 - 1. Very little land is above 310' elevation.
 - 2. Access would have to be acquired; probably by an easement over an existing private road.
 - 3. Much of the site is flooded when the water level is above normal pool.

III. Proposed Facilities

No development is proposed for Piney Grove.

BURROUGH MILL LANDING (7)
PLATE 7-35

I. General Description

- A. This site contains 68 acres.
- B. It is located on the east side of the Nutbush Creek arm.
- C. N. C. State Road 1365 terminates on the site providing excellent access.

II. Site Analysis

- A. Positive Site Features
 - 1. State Road 1365 runs through the site to the water.
- B. Negative Site Features
 - 1. Soils and slopes on the entire site are unsuitable for recreation development.

III. Proposed Facilities

No development is proposed for this site.

DUCK ISLAND (22)
PLATE 7-35

I. General Description

- A. Duck Island contains approximately 39 acres.
- B. It is located at the confluence of Island Creek and the main reservoir.
- C. It is the only island of significant size and elevation on the reservoir.

II. Site Analysis

- A. Positive Site Features
 - 1. The general conformation of Duck Island is of two small hills.
 - 2. The island is heavily wooded with mixed hardwood/pine vegetation occupying one half the island and upland hardwoods on the other half.
 - 3. The site is easily accessible by boat.
- B. Negative Site Features
 - 1. Management of any development on the island would be quite difficult.

III. Proposed Facilities

No development is proposed for this site.

BUCHANAN'S WOODS (28)

PLATE 7-35

I. General Description

- A. This site consists of approximately 353 acres.
- B. The site is located 2½ miles south of Clarksville.
- C. Access to the site is along an old trail from Virginia State Road 723.

II. Site Analysis

- A. Positive Site Features
 - 1. The site has rolling topography which lends visual interest to the area.
 - 2. The area is heavily wooded except for a couple old agricultural fields.
 - 3. There are existing trails over much of the site.
 - 4. The area has a very long frontage on the water.
- B. Negative Site Features
 - 1. The area was heavily infested by pine beetles causing extensive damage to the vegetation.
 - 2. A nearby sawmill generates a good deal of noise which is audible on the site.
 - 3. There are soil and slope limitations for intensive recreation on part of the site.

III. Design Intent

- A. This large parcel of land will be developed for hunting and a wildlife management program will be initiated.
- B. Parking will be provided for day use hunters.
- C. Existing trails will be maintained for use by hunters but no new trails will be built.

IV. Proposed Facilities

- A. A parking area with 25 spaces will be built for use by hunters.
- B. The area will be intensively managed for wildlife.

NUTBUSH WOODS (13)
PLATE 7-36

I. General Description

- A. Nutbush Woods contains 38 acres.
- B. It is located on the eastern side of a long, narrow peninsula which juts into the Nutbush Creek arm.
- C. Access to the site is from N. C. State Road 1329 but would require acquisition of a right of way.

II. Site Analysis

- A. Positive Site Features
There are no positive features on this site.
- B. Negative Site Features
 - 1. The site has very little land above the five year flood pool (310' m.s.l.).
 - 2. Soils are unsuitable for intensive development on 90% of the site.
 - 3. Access to the site will have to be acquired from a right of way over approximately 550 feet of private land.
 - 4. Frequent high water levels have been damaging to the vegetation on much of the site.

III. Proposed Facilities

No development is proposed for this site.

WALNUT HILL (19)
PLATE 7-36

I. General Description

- A. Walnut Hill site consists of 125 acres of heavily wooded terrain.
- B. It is located on Mill Creek off of Virginia State Road 748.
- C. Access to the site would have to be acquired by gaining a right of way over private land.

II. Site Analysis

- A. Positive Site Features
 - 1. The site has high visual quality due to diverse vegetation over the entire site.
 - 2. Good views across the water can be gained from several locations on the site.
 - 3. Approximately 90 acres are buildable and above the five year flood pool.
- B. Negative Site Features
 - 1. Access will have to be acquired over private land.

III. Design Intent

- A. It is intended that this site be developed under lease to a quasi-public group.
- B. Walnut Hill is environmentally suitable for all types of recreation development but is proposed for group camping.

IV. Proposed Facilities

- A. Facilities to be built at Walnut Hill include an access road and a large group camping area.

OAKLEAF POINT (44)
PLATE 7-36

I. General Description

- A. Oakleaf Point contains approximately 515 acres.
- B. The area is accessible by a dirt road leading from Virginia State Road 703.
- C. The area is a peninsula bordered by Butcher's Creek and Panhandle Creek at the confluence of these two with the reservoir.

II. Site Analysis

- A. Positive Site Features
 - 1. The site is easily accessible from U.S. Highway 58, a major project transportation route.
 - 2. Diverse vegetation and a complex shoreline contribute to the high visual quality on this site.
 - 3. Much of the area is cleared fields which will significantly reduce construction costs.
 - 4. Most of the area is above the 5-year flood pool and has suitable soils and slopes for intensive development.
- B. Negative Site Features
 - 1. There are small areas on the site, mostly hillsides and shoreline, that have limitations to development.
 - 2. Small areas of pine beetle infestation are scattered around the site.

III. Design Intent

- A. The area will be developed as a major day use complex.

IV. Proposed Facilities

- A. Seventy-five picnic units and a major beach will be the major day use facilities at Oakleaf Point.
- B. A two lane boat launch and a fishing area will be developed.

LONG GRASS POINT (17)
PLATE 7-37

I. General Description

- A. This site contains approximately 65 acres.
- B. It is located at the end of Virginia State Road 826 about 3.5 miles southwest of the project dam.
- C. The area is located at the confluence of the Roanoke River and Nutbush Creek.
- D. The site is surrounded by active agricultural land uses.

II. Site Analysis

- A. Positive Site Features
 - 1. The site has three areas with buildable land above the five year flood pool.
 - 2. Its location at the confluence of the two reservoir branches allowing natural beaches to form along its banks.
 - 3. Several small islands located near the site provide visual interest.
- B. Negative Site Features
 - 1. The site is small with about 25 acres of buildable land.
 - 2. Its location is slightly distant from the major local travel patterns.

III. Design Intent

- A. The area is intended to provide day use facilities for local residents.
- B. Picnic units should be widely spaced to provide privacy.
- C. A beach area and play area will be developed as support facilities.

IV. Proposed Facilities

- A. Twenty-five Picnic Units will be provided along with parking, a playground, and open play areas.
- B. A minor beach will be located on the northeast shore.

VIKING HILLS PARK (35)
PLATE 7-37

I. General Description

- A. Viking Hills Park contains approximately 600 acres.
- B. The area is located on the south shore of the reservoir approximately half way between Clarksville and South Boston.
- C. The area consists of steep hillsides and flat ridges.
- D. The site has several hundred feet of frontage along Virginia State Road 722.

II. Site Analysis

- A. Positive Site Features
 - 1. The topography of the site is varied and dramatic with numerous good vistas to the reservoir.
 - 2. The site is easily reached from both Clarksville and South Boston.
- B. Negative Site Features
 - 1. There are severe limitations for intensive development due to soils and slopes over almost 75% of the site.
 - 2. The entire shoreline of the site is too steep to permit access.

III. Design Intent

- A. The area is ideally located to serve the two nearby towns.
- B. Although this area does not meet the criteria for intensive recreation, the site's location and attractiveness make it quite desirable for development.
- C. Development will be sited and designed to have limited impact on most of the site.
- D. Extensive programs of forest and wildlife management will be initiated.

IV. Proposed Facilities

This area will be developed as a fifty unit Class A camping area.

BERRY HILL SHORES (18)
PLATE 7-38

I. General Description

- A. Berry Hill Shores contains 39 acres.
- B. The site is located north of Virginia State Road 826.
- C. Access to the site would have to be acquired.

II. Site Analysis

- A. Positive Site Features
 - 1. The site contains approximately 25 acres of buildable land above 310'.
 - 2. It is bordered on two sides by coves and the waters surrounding the site are protected.
- B. Negative Site Features
 - 1. About 10 acres of the site have been damaged by pine beetle infestation.
 - 2. Access would have to be acquired by right of way over private land or an easement on an existing dirt road.
 - 3. The site is small and isolated from the major travel patterns.

III. Proposed Facilities

No development is proposed for this site.

MOORESVILLE WOODS (41)
PLATE 7-38

I. General Description

- A. This site contains 49 acres.
- B. The site is located on the north side of the reservoir, directly across from Clarksville.
- C. The area has one edge adjacent to U.S. Highway 15 allowing ready access.

II. Site Analysis

- A. Positive Site Features
 - 1. The location of this site is right at the area of highest traffic concentration.
 - 2. An existing dirt road runs down to the shoreline.
- B. Negative Site Features
 - 1. Intensive Development is limited by soils and slopes on most of the site.

III. Proposed Development

No future development is proposed for this area.

BOYDTON LANDING (48)
PLATE 7-38

I. General Description

- A. This large area contains approximately 375 acres.
- B. The site is located on the east shore of Butcher's Creek at its confluence with the main reservoir.
- C. Access has to be gained by acquisition of a right of way from Virginia 823.

II. Site Analysis

- A. Positive Site Features
 - 1. There are several large old fields located on the site.
 - 2. The area's complex shoreline and diverse vegetation contribute to its high visual quality.
 - 3. A revolutionary war soldier's grave is located on the site.
 - 4. The location of this site is very good for use by the Town of Boynton.
- B. Negative Site Features
 - 1. There are small areas of pine beetle infestation on the site.
 - 2. Access to the area will have to be acquired over approximately 800 feet of private land.

III. Design Intent

- A. The soldier's grave on the site will be protected as a focal feature for users of the site.
- B. The area will be developed as a major overnight facility.

IV. Proposed Facilities

- A. Fifty Class A Camp Units and 75 Class B Units will be developed.
- B. A two lane boat launch and minor beach will be built for use by campers.

BEAVER WOODS (23)
PLATE 7-39

I. General Description

- A. This area consists of 223 acres.
- B. The area is located partly in Virginia and partly in North Carolina off Virginia State Road 820.
- C. The site is entirely wooded.

II. Site Analysis

- A. Positive Site Features
 - 1. The area is heavily wooded with mixed woodlands and a few large pine stands.
 - 2. The area is flat and slopes moderately to the water.
 - 3. The site is in a good location to ease congestion on the Longwood boat launch.
- B. Negative Site Features
 - 1. Ninety percent of the area is covered with Iredell soils which are shallow and have slow permeability, making them unsuitable for intensive recreation.
 - 2. Access will have to be acquired over approximately 1200 feet of private land.

III. Proposed Development

No future development is proposed for this area.

SOUDAN LANDING (30)
PLATE 7-39

I. General Description

- A. The Soudan Landing area contains 416 acres.
- B. It is located on the west side of Grassy Creek near its confluence with the main reservoir.
- C. Access to the site is from Virginia State Road 821 which terminates on the site.
- D. The area is a long, broad peninsula.

II. Site Analysis

- A. Positive Site Features
 - 1. The site is located close to the Town of Clarksville and Merrifield Acres, the largest subdivision on the reservoir.
 - 2. The vegetation of the area is diverse, containing dense pine stands, upland hardwoods, and old fields.
 - 3. The topography is rolling giving the area visual interest.
- B. Negative Site Features
 - 1. The area has some low wet areas which should be avoided.
 - 2. Small areas on the site have soil and slope limitations for intensive recreation development.

III. Design Intent

- A. The area is primarily intended for use by residents of Clarksville and Merrifield Acres.
- B. A boat launch will be provided to help ease congestion at Clarksville Marina.
- C. Primary uses in addition to the boat launch will be picnicking and swimming.

IV. Proposed Facilities

- A. A day use area will be built containing 50 picnic units and associated facilities.
- B. A two lane boat launch will be built.
- C. A minor beach will be provided for day use.

SOUDAN VILLAGE (24)
PLATE 7-40

I. General Description

- A. The Soudan Village site is a 383 acre peninsula.
- B. Virginia State Road 822 terminates at the water's edge on the site providing excellent access.

II. Site Analysis

- A. Positive Site Features
 - 1. Access is readily available to this site.
 - 2. The site is well located in relation to the major transportation patterns at the project.
 - 3. The site is presently used for primitive camping although no facilities have been provided.
- B. Negative Site Features
 - 1. Forty percent of the site is covered with soils having severe limitations for intensive recreation development.
 - 2. Much of the site is low lying and wet, very little is above the 5-year flood pool.
 - 3. Existing vegetation on the site is sparse and much is unhealthy.

III. Proposed Facilities

No future development is proposed for this area.

GARRETTS WOODS (25)

PLATE 7-41

I. General Description

- A. This site contains 320 acres.
- B. It is located on the east side of Grassy Creek immediately north of the Virginia/North Carolina state line.
- C. Access to this site is over old farm roads.

II. Site Analysis

- A. Positive Site Features
 - 1. This large site is heavily wooded. About one half of the site is covered with young pine, the other half is upland hardwoods.
 - 2. Flat topography makes this site easily buildable.
 - 3. The site is well located in relation to transportation patterns.
- B. Negative Site Features
 - 1. Access will have to be acquired over almost two miles of private land.
 - 2. Unsuitable soils cover approximately 60% of the site.

III. Design Intent

- A. This site will be developed as a medium sized camp area.
- B. Because of the high cost of acquiring access it will be a low priority site.
- C. A beach and boat launch will be provided primarily for use by campers on the site.

IV. Proposed Facilities

- A. One hundred camp units are proposed including 25 Class A units and 75 Class B units.
- B. A minor beach will be built to accommodate campers.
- C. A boat launch will be provided with two launch lanes.

TURTLE HEAD PENINSULA (27)
PLATE 7-41

I. General Description

- A. This site is a small peninsula of 55 acres.
- B. It is located on Grassy Creek about 5 miles south of Clarksville.
- C. The area is accessible from Virginia State Road 724.

II. Site Analysis

- A. Positive Site Features
 - 1. The area is readily accessible.
 - 2. The topography is gently sloping and well drained.
 - 3. It is surrounded on three sides by water.
- B. Negative Site Features
 - 1. The area has been infested with pine beetle which destroyed some of the vegetation.
 - 2. There is a low lying area which would have to be filled to build access to the point.

III. Design Intent

- A. The area is proposed for use as a small group camping area.
- B. It is anticipated that the area will be developed under lease to a quasi-public group.

IV. Proposed Facilities

- A. A small group camp area is proposed for this site.

SUNRISE LANDING (31)
PLATE 7-42

I. General Description

- A. Sunrise Landing contains approximately 35 acres.
- B. The area is located in a small cove on the main reservoir about 2 miles east of Clarksville.
- C. The site is reached from Virginia State Road 821 by a dirt road over private land.

II. Site Analysis

- A. Positive Site Features
 - 1. The area is located close to the town of Clarksville, Virginia.
 - 2. The conformation of the site is a small hill with healthy mixed vegetation.
- B. Negative Site Features
 - 1. Access to the area would have to be acquired.
 - 2. The site overlooks Burlington Mills and the Clarksville Sewage Treatment Plant.
 - 3. Noise from Burlington Mills is bothersome on the site.
 - 4. The site is too small for any significant development.

III. Proposed Facilities

No development is proposed for Sunrise Landing.

HOLLY GROVE (46)
PLATE 7-42

I. General Description

- A. This low, flat peninsula covers approximately 56 acres.
- B. It is located on Butcher's Creek just south of U.S. Highway 58.

II. Site Analysis

- A. Positive Site Features
 - 1. The site is conveniently located within one half mile of Route 58.
 - 2. The site's broad, flat ridge is quite suitable for development.
- B. Negative Site Features
 - 1. The area has suffered extensive damage from Southern Pine Beetle infestation.
 - 2. The area's very flat shoreline is surrounded by unattractive mudflats when the water level is low.

III. Design Intent

- A. This area will be developed for fishing and boating access.

IV. Proposed Facilities

- A. A fishing and two lane boat launch will be built on this site.

STAUNTON RIVER STATE PARK EXTENSION (37)
PLATE 7-43

I. General Description

- A. This area contains approximately 550 acres.
- B. The area is located on the north shore of the Dan River above its confluence with the Roanoke River.
- C. The site is hilly and heavily wooded.
- D. The area is leased to the State of Virginia for recreation.

II. Site Analysis

- A. Positive Site Features
 - 1. The area is located adjacent to Virginia's Staunton River State Park.
- B. Negative Site Features
 - 1. The area has been extensively damaged by pine beetles.
 - 2. The area has a short shoreline and extends far inland.
 - 3. Excessive slopes limit the potential for extensive development on about half the site.
 - 4. Access to the area would have to be developed over 1/2 mile of private land.

III. Proposed Facilities

No development is proposed for this site.

BLUESTONE PARK (39)
PLATE 7-44

I. General Description

- A. Bluestone Park contains approximately 710 acres.
- B. The area is located on the north shore of the reservoir at the mouth of Bluestone Creek.
- C. The area is readily accessible from Virginia State Road 858.
- D. The area is comprised of steep hillsides and sharp ridges.

II. Site Analysis

- A. Positive Site Features
 - 1. The area is located nearly adjacent to U.S. Highway 15, a major transportation route.
 - 2. The area is heavily wooded, mostly with upland hardwoods but also with pine stands along the major ridge line.
 - 3. The entire area has been rated as high quality wildlife habitat.
 - 4. There is an existing dirt road along the ridge and existing trails over most of the site.
- B. Negative Site Features
 - 1. The site has severe limitations for intensive development due to soils and slopes over about 80% of the site.
 - 2. Most of the shoreline is too steep to be developed for any use.

III. Design Intent

- A. This area should be intensively managed for wildlife to enhance it's already high quality habitat.
- B. The area is proposed for use as a day use area.
- C. The proposed development will be confined to the extremes of the site in order to protect the larger part of the area.

IV. Proposed Facilities

- A. A day use area will contain fifty picnic units.

AARON ACCESS POINT (36)
PLATE 7-44

I. General Description

- A. This small area contains 38 acres.
- B. It is located on the south side of the reservoir at the mouth of Aaron's Creek.
- C. Access to the site from U.S. Highway 58 over approximately one mile of private land.

II. Site Analysis

- A. Positive Site Features
 - 1. The site is located off one of the major transportation corridors at the project.
 - 2. The site contains a large open field which slopes gently to the water.
 - 3. The conformation of the shoreline is good for development of a boat launch.
- B. Negative Site Features
 - 1. Access would have to be acquired by right of way over one mile of private land.
 - 2. The area is too small for any large development.

III. Proposed Facilities

- A. No development is proposed for this site.
- B. The name "Aaron Access Point" has been reassigned to the northeast portion of the Highway 58 crossing of Aaron's Creek. This area has been developed as a boat launch area.

RIVERDALE ACCESS AREA (56)
PLATE 7-44

I. General Description

- A. This area consists of 66 acres in the floodplain of the Dan River.
- B. The area is presently entirely wooded with Bottomland Hardwoods.

II. Site Analysis

- A. Positive Site Features
 - 1. The area is located directly across the Dan River from the City of South Boston.
- B. Negative Site Features
 - 1. The area is located in the Dan River floodplain and subject to periodic flooding.
 - 2. Fluctuating water levels do not allow boats access to the reservoir from this area.

III. Proposed Facilities

No development is proposed for this site.

NEWMAN POINT (50)
PLATE 7-45

I. General Description

- A. This area contains approximately 200 acres.
- B. The area is located on Eastland Creek and access will have to be acquired from Virginia State Road 707.

II. Site Analysis

- A. Positive Site Features
 - 1. The J. H. Kerr Reservoir "Archaeological Survey" identified a significant archaeological site at this area.
 - 2. The area is covered with healthy vegetation which is predominantly pine.
- B. Negative Site Features
 - 1. Access is difficult to this site. A right of way will have to be acquired over private land.
 - 2. About 30% of the site is limited for intensive development due to soil restrictions.

III. Design Intent

- A. The site will be developed for day use.

IV. Proposed Facilities

- A. Proposed facilities include 50 picnic units and a minor beach.

CAMPER'S COVE (51)
PLATE 7-45

I. General Description

- A. This small area is a point at the head of a cove on Eastland Creek.
- B. The area contains about 48 acres.
- C. Access is available from a dirt road over private land.

II. Site Analysis

- A. Positive Site Features
 - 1. The waters of the cove are protected from severe wave action.
- B. Negative Site Features
 - 1. Access would have to be acquired by easement over a private road.
 - 2. Over 70% of the vegetation has been damaged by pine beetle.
 - 3. The shoreline of the area is steep, limiting its usefulness for access to the water.

III. Proposed Facilities

No development is proposed for this area.

INGLEWOOD (53)
PLATE 7-45

I. General Description

- A. This area contains approximately 382 acres.
- B. It is located three miles west of the dam.
- C. The area is a large peninsula of rolling hills with a complex shoreline.

II. Site Analysis

- A. Positive Site Features
 - 1. The area has high ridges and a steep shoreline allowing dramatic water views.
 - 2. The complex topography and shoreline give the area high visual quality.
 - 3. Inglewood is predominantly covered with upland hardwoods.
- B. Negative Site Features
 - 1. Excessive slope is a limiting factor to intensive development over approximately 80% of the site.
 - 2. The north shoreline has been damaged by erosion due to severe wind/wave action.
 - 3. Pine beetle damage occurs on limited portions of the site.
 - 4. Access into this area will have to be acquired from Virginia State Road 707.

III. Design Intent

- A. The area is proposed for a Class A camping area.

IV. Proposed Facilities

- A. A self-sustaining camping area will be developed with fifty Class A units.

7-07 POTENTIAL INTERPRETIVE FEATURES

A. General. The interpretation of project resources is a powerful tool with which the visitor can be oriented to the project and its facilities, can learn about the history, purposes and operation of the project, and can be made aware of the role of the Corps of Engineers in the development and management of basin, regional and national water resources. John H. Kerr Dam and Reservoir offers a variety of features which are worthy of interpretation. Currently, some of these features are interpreted but the full spectrum of project resources are not effectively interpreted.

B. Existing Programs. Current interpretive programs fall into three general areas: displays at the Resource Manager's Offices, guided tours of the powerhouse during the summer months, and programs conducted by the park naturalist during the summer months. All of the interpretive programs are very limited in their scope and are in need of expansion in order to convey the story of the project. In addition to the themes of project history, role of the Corps of Engineers, and project operations which are being interpreted, other project resources can be developed for interpretation.

C. Potential Project Interpretive Features. The rich resources of John H. Kerr Dam and Reservoir offer the opportunity to increase the visitors knowledge of the project and the role of the Corps of Engineers in managing these resources. The resources of the project suitable for interpretation can generally be termed either cultural or natural. These interpretive groupings are briefly discussed below. Specific proposed interpretive sites, their features, and proposed interpretive activities are listed in Table 7-03. The locations of these sites are shown on Plates 7-46 and 7-47, the Interpretive Features Map.

1. Cultural Features. Cultural features of the project exhibit the effects of man upon the landscape. Cultural features generally involve the history, operation, and management of the project, and the history of man's inhabitation of the project area. Areas suitable for the interpretation of the project include the dam and powerhouse, and the proposed visitor center/resource manager's office. The John H. Kerr Dam is the major focal point of the project. The operation of the dam for power production, flood control, and other authorized purposes, lends itself to interpretation. Guided tours should be continued at the dam and powerhouse, and exhibits should be displayed in accordance with an interpretive prospectus. The proposed Visitor Center/Resource Manager's Office will serve as the center of interpretive activities at the project. The center and its functions are described in the Interpretive Prospectus for the Design of Resource Manager Office/Visitor Center and Powerhouse Visitor Lobby.

TABLE 7-03

INTERPRETIVE FEATURES
JOHN H. KERR DAM AND RESERVOIR

SITE	LOCATION AND/OR MAP REFERENCE	FEATURES	POTENTIAL INTERPRETIVE ACTIVITIES
PROJECT OPERATIONS			
John H. Kerr Dam and Powerhouse	(A)	John H. Kerr Dam Powerhouse	Powerhouse tours. Interpretation of electric power generation, flood control, reservoir regulation. Activities supplementing visitor center interpretation.
Proposed Visitor Center/Resource Manager's Office	North Bend Park (B)	Visitor oriented displays and programs	Visitor orientation to project features, facilities, and purposes. Explanation of Corps' role in the development and management of river, basin, and national water resources. Interpretation of the project's natural and cultural resources.
ARCHAEOLOGICAL AND HISTORICAL RESOURCES			
Judge Richard Henderson Property	Satterwhite Point A	Site of mid-eighteenth century homestead. Subsurface structural remains, possibly the site of Judge Henderson's son's residence.	Interpretation of colonial history. Judge Henderson was responsible for the exploration and settlement of Kentucky.
Glebe House	Nutbush Creek Recreation Area B	Plantation overseer's residence remains. Residence built: 1750. Destroyed by fire: 1959.	Interpretation of life of farmers after 1865.

TABLE 7-03 (CONT'D.)





SITE	LOCATION AND/OR MAP REFERENCE	FEATURES	POTENTIAL INTERPRETIVE ACTIVITIES
Samuel Tarry House	Ivy Hill 	Remains of 2 story residence. Large chimney falls, partial basement, remains of outbuildings	Interpretation of colonial plantations and their functions. Site believed to be part of Ivy Hill Plantation.
Occoneechee Plantation	Occoneechee State Park 	Remains of extensive plantation dating from 1830's. Remains of terraced formal gardens, stone foundations and chimney falls, outbuildings.	Interpretation of plantation life. Archaeological investigation of slave residences, domestic structures and outbuildings.
Colonial Residence	Newman Point 	Well-preserved historic site. Intact stone foundations and hand-made brick chimney falls. Ceramics dating to 1750-1850.	Interpretation of site layout and material culture of the pre-Civil War rural south.
NATURAL AREAS			
Buggs Island	On Roanoke River downstream of dam 	High wildlife habitat nesting ground for waterfowl, potential bald eagle nesting area.	Interpretation of project's wildlife resources. Natural trails, possibly by way of bridge from Liberty Cemetery nature trail. Good location for observation blinds, food plots. Potential cooperative programs with Virginia Commission of Game and Inland Fisheries.

TABLE 7-03 (CONT'D.)

SITE	LOCATION AND/OR MAP REFERENCE	FEATURES	POTENTIAL INTERPRETIVE ACTIVITIES
Keats Peninsula	Immediately south of dam [B]	High interspersions of habitat types. High wildlife value.	Nature study conducted in conjunction with proposed recreational development at site and existing development at Palmer Point and Kimball Point.
Ivy Hill	Ivy Hill Recreation Area (undeveloped portion) [C]	High Wildlife Habitat.	Nature study conducted in conjunction with proposed recreation development and historic interpretive features. Nature trails, food plots, displays.
Beaver Pond	Banister River south of Scottsburg [D]	High wildlife habitat, bottomland hardwoods. Area under lease to Commonwealth of Virginia	Nature study. Interpretation of bottom- land vegetation types, management of forest resources, interpretation of wildlife management. Cooperation of State and Corps in resources management.
Occoneechee State Park Panhandle	Occoneechee State Park [E]	Diverse, rugged topography, high interspersions, high wildlife habitat value, extensive, isolated land area.	Nature study, wildlife food plots, inter- pretation of forest types and their relation to wildlife productivity.

Other cultural features include the archaeologic and historic resources of the project. The Archaeological Survey of John H. Kerr Reservoir has identified five historic sites suitable for interpretation. The interpretation of these sites would add to the enjoyment of the visitor and to their understanding of the project.

A second category of interpretive features is that of natural or environmental features. The natural features and areas suitable for interpretation include areas of high wildlife habitat and diversity as identified in the Environmental Inventory and Analysis. Interpretive activities at both the natural and cultural features should be conducted in accordance with a project-wide interpretive prospectus.

7-08 INTER-SITE TRAIL DEVELOPMENT

A. General. The Virginia Outdoors Plan (1979) indicates a very strong need for hiking trails in the region surrounding Kerr Reservoir. Approximately 30 miles of inter-site hiking trails and 12.9 miles of canoe trails are proposed to help meet this large unmet demand. Each proposed trail should be studied further before design to verify the demand for the particular facility.

B. Hiking Trails. Hiking trails are designed to provide project visitors with a long hiking experience in areas of scenic or natural interest and to connect related recreation areas. The general location of hiking trails is shown on the Interpretive Features Map and discussed in this section. Final routing of hiking trails should be made on the basis of a field survey.

A 3.1 mile trail is proposed for the Ivy Hill recreation area. The trail will originate in the recreation area, as shown on Plates 7-08 and 7-09 of the site plans and travel through the undeveloped portion of the site. The trail will be used for both hiking and interpretive activities and will provide access to the site of the Samuel Tarry House.

A 6.8 mile hiking trail is proposed to link the existing camping areas at Longwood and the group camp on Turtle Head Peninsula to the hunting area at Buchanan's Woods on Grassy Creek. A loop trail is shown within Buchanan's Woods for use by hunters. These trails will allow hunters to camp in a variety of areas and to have access to the hunting area.

A hiking trail is also proposed to provide access throughout Occoneechee State Park. This site has a high habitat quality and is the site of Occoneechee Plantation, one of the largest and most significant archaeologic sites investigated in the Archaeological Survey. These features have excellent interpretive value. The trails link these historic sites with the camping areas and existing development at

Occoneetchee State Park. Existing roadbeds which can be found throughout the site provide an excellent base for the 6.8 miles of hiking trails proposed here.

Another hiking trail is proposed to start at the camping area in North Bend Park, follow the shoreline to the camping area in Inglewood, and then proceed to Newman Point where the historic site may be observed. This trail is 8.3 miles long.

The final trail to be discussed is the 3.6 mile trail proposed to connect the camping areas at Hibernia and Townsville Landing. This trail will follow the irregular edge of the reservoir providing views over Nutbush Creek.

C. Canoe Trails. A 12.8 mile canoe trail is proposed to provide a canoeing experience for visitors to John H. Kerr Reservoir. The trail will start at Clover Landing off of U.S. Highway 360 and follow the Roanoke River to Staunton View where the trail terminates. Existing launching ramps may be used for access by canoes to the river. Staunton River State Park could also be used as the terminus point if the State of Virginia chooses to operate a concession.

7-09 RESOURCE MANAGER'S OFFICE/VISITOR CENTER

The proposed resource manager's office/visitor center facility is presently in the final stages of the Design Memorandum phase (D.M. No. 3). The interpretive prospectus was approved by the South Atlantic Division in June, 1979.

The facility will be located approximately one mile west of the dam on a peninsula next to North Bend Park and the reservoir operations and maintenance area. This location will provide the building with excellent views of the dam and reservoir. The building is a single story structure, approximately 100 feet on a side, with a gross floor area of 9,150 square feet. The building has been conceived as a series of pitched shed roofs surrounded by a central flat core area. This concept will break the large plan area into identifiable functional areas and scale the building to the site. The pitched roof forms were selected to reflect the domestic rural architecture of the countryside. Exterior finish materials have been selected to blend with the natural landscape setting and to reinforce the rural character of the architecture. For a more detailed analysis of the facility, see Design Memorandum Number 3, Volume II - Design, John H. Kerr Dam and Reservoir.

7-10 GENERAL DEVELOPMENT PRIORITIES

A system of development priority classifications has been adopted

for John H. Kerr Reservoir to provide guidance for future developmental actions. The purpose of these classifications is to allow flexibility in the pattern of development while assuring that recreation needs are met. Four classes of development priority have been assigned, these are discussed below. Development priorities for John H. Kerr Reservoir are illustrated in Table 7-04. No priority class is assigned to quasi-public lease sites because it is felt that leasees will develop facilities as they are able to.

A. Priority A. Priority Class A includes the rehabilitation of existing facilities and the improvement and expansion of marina facilities. Existing areas that are heavily used must be protected from further degradation and brought up to Corps of Engineers standards as described in Exhibit A to this plan. A significant demand for additional marina facilities has been identified at the reservoir. Existing marina operators should be encouraged to upgrade and expand their facilities. A new operator should be located to develop a facility at one of the proposed locations.

B. Priority B. Priority B items include the addition of new facilities for which there is a high demand as determined in Chapter 4 and accommodating such management goals as eliminating smaller areas and expanding existing developments. Also, since the development of self-supporting facilities is a goal of this plan, high priority is given to those facilities that will pay for themselves. Facilities classified as Priority B based on recreation demand include camping areas, boat launch lanes, and swimming areas.

C. Priority C. Facilities classified as Priority C include all facility development needed to meet the projected demand to the year 2030. Included are the development of new camping areas, picnic areas, group camps, boat launches, and beaches. Projected facility needs are discussed in Chapter 4 and summarized in Table 4-08. Priority C is given to these areas based on environmental suitability, locational factors, and amenity values.

D. Priority D. Proposed development classified as Priority D is that for which the current projections do not indicate a need. These areas are offered as alternative sites should other proposed areas prove undesirable, or as surplus to accommodate changing patterns of recreation use. These lands are given lower priority due to environmental constraints, poor location with respect to regional transportation patterns, poor location with respect to equitable distribution of facilities around the reservoir, or excessive development costs.

TABLE 7-04A

DEVELOPMENT PRIORITIES, JOHN H. KERR RESERVOIR;
EXISTING AREAS OPERATED BY CORPS OF ENGINEERS

AREA	PRIORITY CLASS	FACILITY DESCRIPTION
Palmer Point	A	Rehabilitate existing facilities, relocate boat launch
	B	Relocate camping units to Ivy Hill
Ivy Hill	A	Rehabilitate existing facilities
	B	Develop existing facilities
	C	Trail system into undeveloped peninsula
Island Creek	A	Rehabilitate boat launch
	C	Develop new day use area, relocate existing day use area
Grassy Creek	A	Rehabilitate day use areas and boat launch
	B	Relocate camp units to Ivy Hill and Longwood
	C	Develop new day use area
Longwood	A	Rehabilitate existing facilities, shoreline protection
	B	Develop proposed Class A camping, boat launch
	C	Develop new day use area
Buffalo Springs Wayside	A	Rehabilitate existing picnic units
Buffalo	A	Rehabilitate existing picnic units, boat launch, shoreline protection
	B	Relocate camp units to Longwood
	C	Develop new day use area
Staunton View	C	Relocate day use area
Bluestone Landing	A	Add new boat launch lane and car/trailer parking
	C	Relocate picnic units
Rudds Creek	A	Rehabilitate existing facilities
	B	Add parking to boat launch area
	C	Relocate camp units and day use area
Eagle Point Landing	A	Develop new camping area
Eagle Point Landing	A	Rehabilitate boat launch area

TABLE 7-04A (CONT'D.)

AREA	PRIORITY CLASS	FACILITY DESCRIPTION
Eastland Creek Landing	A C	Rehabilitate picnic units, boat launch Relocate camp units to Rudds Creek Develop group camp area
North Bend Park	A B	Rehabilitate existing facilities Improve marina facility (operator) Resource Manager's Office/Visitors Center Develop new picnic area
Tailrace Access Area	A B	Rehabilitate boat launch, and car/trailer parking Develop new picnic area
Clarksville Overlook	B	Develop boat launch, picnic area

TABLE 7-04B

DEVELOPMENT PRIORITIES, JOHN H. KERR RESERVOIR;
EXISTING AREAS OPERATED BY OTHERS

AREA	PRIORITY CLASS	FACILITY DESCRIPTION
Kimball Point	C	Eliminate existing day use area, boat launch Develop two group camp areas
Henderson Point	B C	Develop reserved group use area Expand existing day use area
County Line Park	B C	Eliminate Class B camp area and develop Class A Develop rental cabin development
Bullocksville Park	B C	Develop Class A camping area Eliminate existing camp area and develop day use area on the site Develop new Class B camp area
Flemingtown Road Marina (Meekins Marina)	A	Remove mobile homes on the site Rehabilitate and expand marina facility

TABLE 7-04B (CONT'D.)

AREA	PRIORITY CLASS	FACILITY DESCRIPTION
Clarksville Marina	A	All marina expansion and rehabilitation
Satterwhite Point Park	A B	Marina expansion and rehabilitation Develop new Class A camp area
Nutbush Creek Recreation Area	A C	Rehabilitation of existing facilities Eliminate day use area, develop group camp area
Williamsboro Wayside	A	Develop boat launch area
Townsville Landing	C	Develop new day use and camping areas Develop hiking trail to Hibernia Relocate marina facility to Hibernia
Hibernia Recrea- tion Area	C	Develop cabin rental complex Eliminate camp area and develop new day use area
Oconæechee State Park	A B C	Class A camping, swimming pool complex Additional parking in boat launch areas Visitor's Center Develop new picnic areas, camping areas
Hyco Landing	-	No additional development is proposed
Clover Landing	-	No additional development is proposed

TABLE 7-04C

DEVELOPMENT PRIORITIES, JOHN H. KERR RESERVOIR;
PROPOSED RECREATION AREAS

AREA	PRIORITY CLASS	FACILITY DESCRIPTION
South Dike Park	B C	Develop nature trail and associated parking Develop picnic area and shoreline trail
Keats Penin- sula	A C	Develop marina and associated camping area Wildlife Management and interpretive trail

TABLE 7-04C (CONT'D.)

AREA	PRIORITY CLASS	FACILITY DESCRIPTION
Buchanan's Woods	C	Wildlife Management and parking for hunters
Walnut Hill	D	Quasi-Public use area
Oakleaf Point	C	Develop day use area, beach, boat launch, and fishing area
Long Grass Point	D	Develop day use area and beach
Viking Hills Park	C	Develop camping area
Butcher's Bay View	B C	Develop Class A camp area, boat launch Develop Class B camp area
Boydton Landing	C	Develop camping area and boat launch
Soudan Landing	C	Develop day use area, beach, and boat launch
Garretts Woods	D	Develop camping area, beach, and boat launch
Turtle Head Peninsula	D	Quasi-Public use area
Holly Grove	D	Develop as fishing area and boat launch
Bluestone Park	C D	Develop boat launch and day use area Develop camping area
Newman Point	D	Develop day use area
Inglewood	D	Develop Class A camping area

7-11 REHABILITATION PRIORITIES

In Section 7-10 all rehabilitation of existing facilities at Corps of Engineers operated areas was given Priority A. To provide further guidance in accomplishing this rehabilitation, the projected

rehabilitation efforts are further broken down over a four year time frame. The purpose of this breakdown is to spread the rehabilitation costs over a number of years and put the earliest investment in areas where it is most needed. Prioritization of rehabilitation is based on the condition of existing facilities, the intensity of use, and future development plans for each area.

A. Year 1. The year one effort should be confined to North Bend Park. It is the largest, most heavily utilized COE operated area on the reservoir. The initial effort should include approximately half of the campsites, all picnic sites (and associated buildings), the large beach, and approximately 300 yards of shoreline protection.

B. Year 2. In year two the rehabilitation of North Bend Park will be completed including the rest of the campsites (and associated buildings), the small beach, on-site trails, and approximately 200 yards of shoreline protection. In addition, all rehabilitation at Rudd's Creek will be done in year two.

C. Year 3. Rehabilitation efforts in year three will include all work projected for Longwood, Eastland Creek, Ivy Hill, Clarksville Overlook, and Buffalo. All these areas are heavily used and in need of rehabilitation.

D. Year 4. Rehabilitation assigned to year 4 includes those areas that are not heavily used and areas where facilities are in deteriorating but not poor condition. Rehabilitation for year 4 includes Grassy Creek, Island Creek, Palmer Point, Bluestone Landing, and Buffalo Springs Wayside.

A listing of all facilities in need of rehabilitation is given in Table 10-13. The total cost of rehabilitation for each site is presented in Table 10-01.

7-12 RELOCATION OF EXISTING FACILITIES

One of the stated objectives of this Master Plan Update is "to propose future recreation area plans that will provide for more efficient management and operation through the consolidation of certain existing areas, and the separation of day use and overnight facilities." The primary considerations in the redesign of existing recreation areas were to provide for self-sustaining facilities, to gain greater control over use of the areas, to eliminate conflicts between uses, and to distribute facilities in accordance with recreation demand. Table 7-05 summarizes the facility relocation proposed for areas operated by the Corps of Engineers.

TABLE 7-05

SUMMARY OF FACILITY RELOCATIONS

<u>AREA</u>	<u>RELOCATION</u>
Palmer Point	Relocate boat launch on site
	Relocate forty-five camp units to Ivy Hill
Island Creek	Relocate nine picnic units on site
Grassy Creek	Relocate five camp units to Ivy Hill and six camp units to Longwood
Buffalo	Relocate fifteen camp units to Longwood
Staunton View	Relocate seven picnic units to North Bend Park and one to Longwood as a camp unit
Bluestone Landing	Relocate six picnic units to Clarksville Overlook
Rudds Creek	Relocate camp area and day use area on site
Eastland Creek	Relocate twenty-five camp units to Rudd's Landing Creek and three to Longwood
Clarksville Marina	Relocate public launching ramp to Clarksville Overlook

CHAPTER 8

SITE REHABILITATION DESIGN CRITERIA

8-01 INTRODUCTION

The design of all proposed recreation areas at John H. Kerr Reservoir will be in accordance with current standards as outlined in the following documents: ER 1110-2-400, "Design of Recreation Sites, Areas, and Facilities"; EM 1110-2-400, "Recreation Facilities Planning and Criteria"; ER 1165-2-400, "Recreation Planning, Development, and Management Policies"; EM 1110-1-103, "Design for the Physically Handicapped"; CERL Technical Report D-63 "Design Guidelines for Recreational Roads"; SADEN-TC, "Criteria for Design of Recreation Roads, Civil Works Projects"; and SADvR 1110-2-10. In addition, Virginia and North Carolina state public health and sanitation requirements, and state building codes must be followed in the detailed design and construction phases of the project.

8-02 GENERAL FACILITY DESIGN CRITERIA

Design criteria and rationale for all planned facilities were developed and applied to the proposed concept site plans during the preparation of this document. Since the construction of all future recreation areas will require the preparation of a detailed Feature Design Memorandum, and since site design concepts and methods are constantly being refined it is not necessary or desirable to include detailed criteria in the Master Plan. However, the design criteria utilized during the preparation of this Master Plan have been included as Exhibit A. This information will be useful to the reader who requires more detailed information concerning the design intent of the team that prepared this Master Plan.

8-03 REHABILITATION DESIGN CRITERIA

A. General. Since Feature Design Memorandums may not be prepared prior to implementing facility rehabilitation projects general design criteria have been included herein. Rehabilitation efforts at John H. Kerr Reservoir will be aimed at upgrading existing facilities to the general standards and criteria provided in Supplement A. The authority for the rehabilitation program is provided by the 1979 Command Goals and Objectives of the U.S. Army Corps of Engineers.

B. Roads. Where possible, existing dirt, gravel, or paved roads that are in poor condition or that are inadequate for current

use levels should be repaired and surfaced to meet the standards for new roads.

C. Parking Areas. Existing parking areas which show signs of excessive wear and unsurfaced areas which are used for parking should be upgraded with paved or gravel surface depending on the amount of use. Existing parking areas may need to be made more functional and circulation patterns improved by redesign and/or the placement of planting islands. Wheel stops should be placed in lots where they are not existing and mounds or vegetative screens should be provided where they are necessary.

D. Boat Launch Lanes. Boat launch areas which have confusing circulation patterns should be re-designed to provide for efficient use of the lanes. Also, lanes in need of repair should be patched or resurfaced to meet the standards for new lanes. Areas where the shoreline is eroding should be rip-rapped or other protection measures should be introduced as described in the shoreline stabilization part of the rehabilitation discussion. The appropriate supporting facilities such as lighting, trash receptacles, courtesy dock and signs should be added where they are lacking.

D. Camping Areas. The rehabilitation of campgrounds should upgrade existing areas to the criteria presented in Exhibit A to this plan. Items which need to be studied further in the rehabilitation of camping areas include:

1. Redesign of roads for improved circulation system.
2. Repaving where necessary.
3. Creation of gravel impact areas.
4. Surface or pave paths worn by foot traffic to control and direct campers to use these paths and reduce the amount of site disturbance.
5. Provide additional landscaping to provide a buffer between sites and to increase the aesthetic quality of the area.

Conversion from an existing picnic area to a camping area may be necessary on sites where conflicts occur between day-use and overnight-use. The design of these new camping areas should incorporate the use of as much of the existing road network, trails, picnic tables and other facilities as possible within the criteria for camping areas.

Photo/Figure 8-01 show an existing campsite and the appropriate measures taken to rehabilitate the site. These measures include



PHOTOGRAPH 8-01
EXISTING CAMPSITE

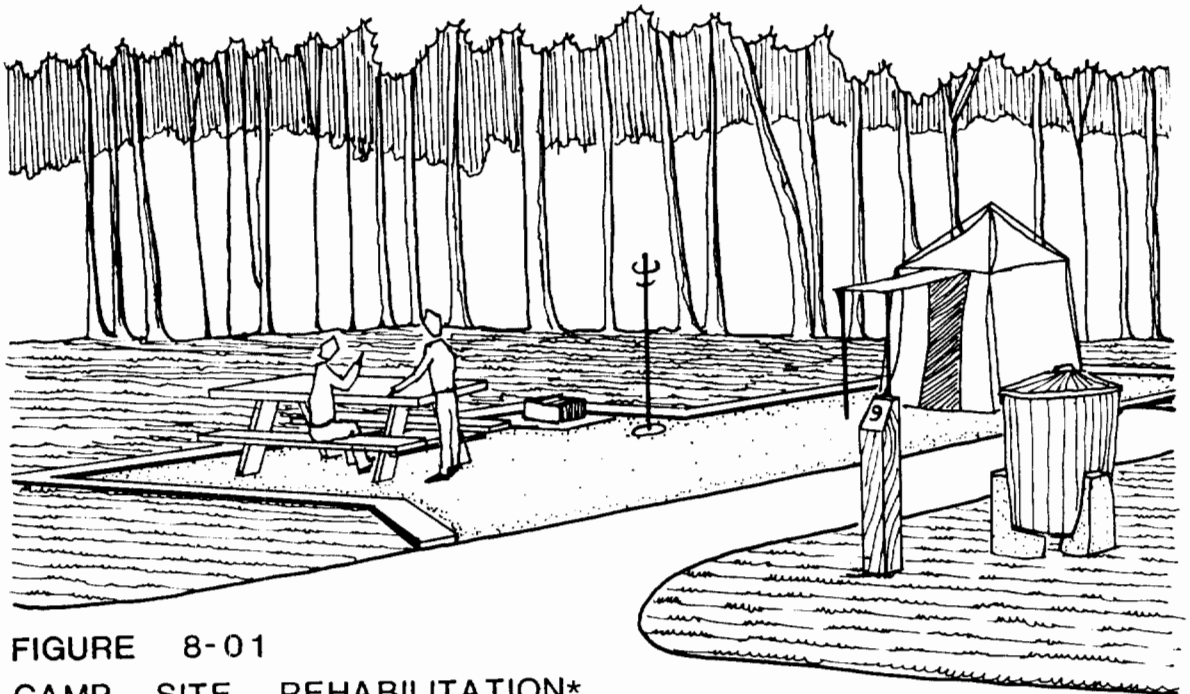


FIGURE 8-01
CAMP SITE REHABILITATION*

*This figure shows the addition of necessary facilities, paving the parking spur and enclosing the impact. Design of sites will vary due to surrounding site constraints.

paving the parking spur and placing it at approximately a 45 degree angle from the road for ease of backing in, adding a gravel impact area to avoid site disturbance, adding a lantern post to avoid damage to trees, and providing a picnic table, grill and trash receptacle.

F. Picnic Areas. Efforts should be made during rehabilitation, and in designing new areas, to direct pedestrian circulation onto surfaces which can sustain the constant impact so as to protect the rest of the site from soil compaction and discharge erosion where foot traffic wears away the ground cover.

Provisions for the handicapped must also be considered. Other rehabilitation efforts would include the addition of picnic tables, trash receptacles, concrete wearing pads and steps where they are needed.

Sites where day-uses and overnight-uses conflict may be re-designed by converting camping areas to picnic areas and vice versa. Where possible, the existing impact areas, picnic tables, grills and roads from camp units may be used to reduce the conversion cost. The design of converted areas should conform to the criteria discussed in the picnic area section of Supplement A. Photo/Figure 8-02 shows an existing picnic site at John H. Kerr Reservoir. The sketch below the photograph demonstrates possible measures taken to rehabilitate this picnic site. These efforts include using tables of heavier construction, placing the table on a concrete pad, surfacing a path to the site, adding a grill, placing trash receptacles in holders, and seeding or placing ground over on areas of bare soil.

G. Swimming Beaches. The major efforts to be considered for the rehabilitation of existing beaches will involve the elimination of drainage and erosion problems by adding diversion berms around beaches and curbing around the sand areas. Other efforts will include the paving of walkways and the addition of the appropriate supporting facilities such as parking areas, bathhouses, trash receptacles, safety buoys, and water fountains. Beaches with slopes that exceed five percent should be studied for the possibility of using retaining walls and grading the beach area to the appropriate slopes. Also, beaches in areas of high wind and wave action should be considered for relocation to coves and areas protected from intense wave action.

H. Playgrounds. In the design and rehabilitation of playgrounds, one of the most important factors to be considered is the safety of the children who will use the area. Existing play structures which are worn or broken should be replaced with new structures which meet the standards of SOP No. 7. The surfaces of playgrounds become worn with time and need to be replenished with



PHOTOGRAPH 8-02
EXISTING PICNIC SITE

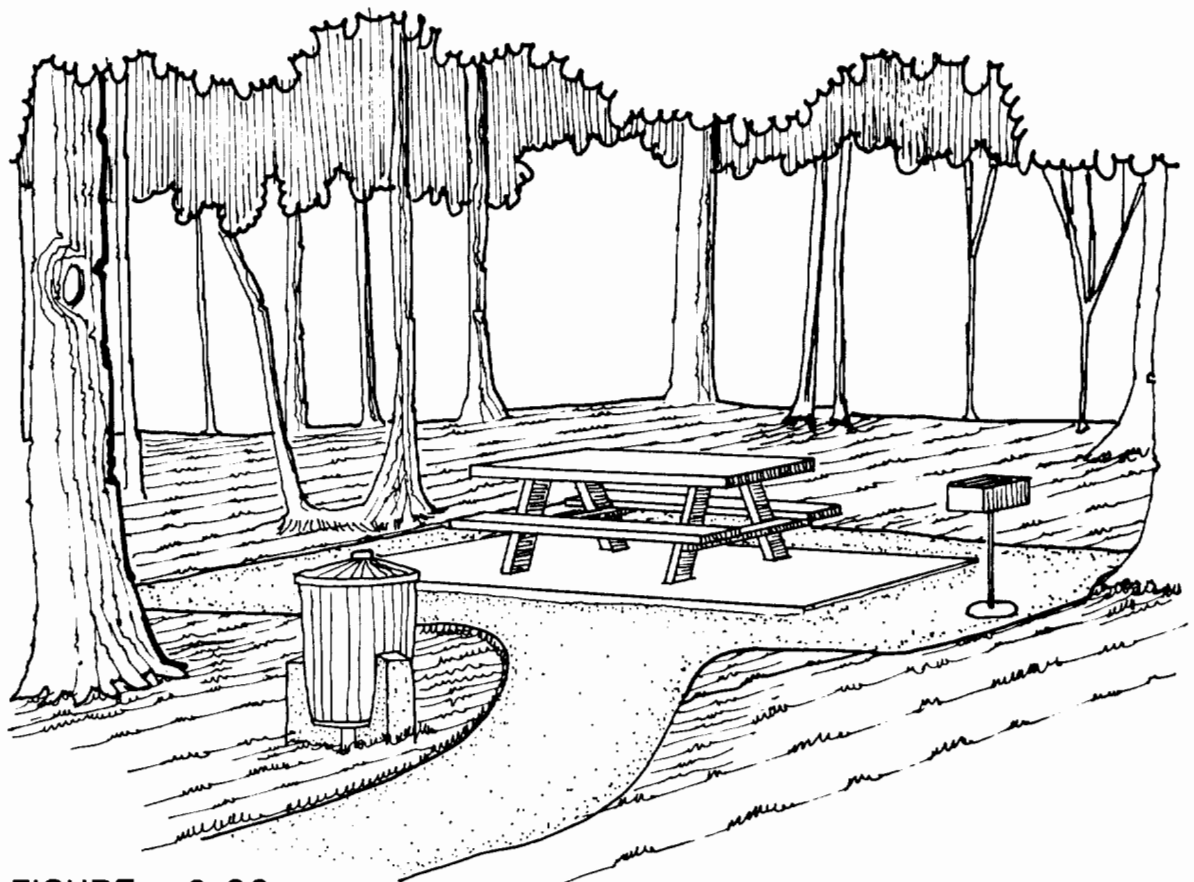


FIGURE 8-02
PICNIC SITE REHABILITATION*

*Rehabilitation at this site shows the addition of a pedestrian path, concrete wearing pad, and other necessary facilities. Efforts will vary at sites and must be studied separately.

additional sand, shredded bark, pea gravel or turf, depending on the existing material. Playgrounds which receive more use than originally anticipated should be made larger and provided with additional play structures.

I. Trails. Pedestrian trails should be sited to direct the traffic or users and to try to limit the area of site disturbance caused by constant foot traffic over an area. In locations where pedestrian use has compacted the soil and eliminated ground cover, effort will be made to aerate and revegetate. Paths and steps will be provided to minimize future site disturbance.

A major effort in rehabilitating existing trails will be to re-surface worn trails with appropriate materials as deemed necessary by further study and as stated in Exhibit A. Trails should be cleared of tree branches and vegetation which may prove dangerous to the users of the trails. Culverts and ditching should be provided where trails are washing away during heavy storms and steps or ramps should be provided where steeper trail areas are eroding. Steps or switch backs and new trails may be specified for areas where the slopes of existing trails are too steep. Further study for an area may determine areas where existing trails should be made accessible to handicapped persons, in which case the materials and criteria discussed in the section on Facilities for the Handicapped in Exhibit A may be followed. Trail markers and signs should also be replaced and added as needed.

J. Signs. As existing signs need to be replaced due to natural deterioration or vandalism, consideration should be given to modifying these existing signs to conform to the standards presented in SADvP 1130-2-1, 1 September 1978, the SAD Sign Handbook. This action will aid in the effort to make all signs throughout the project consistent with each other for positive project identification.

K. Recreation Area Structures. The criteria in this exhibit for new structures has been established to provide for aesthetically pleasing and functional structures throughout the project which also serve to establish unity between sites through the use of the same architectural style and materials. Consideration will be given (during planned rehabilitation efforts) to make existing structures conform to these standards and add to the unity of the project. Rehabilitation efforts will include, but are not limited to the following:

1. Installation of new exterior siding material which is consistent with the materials used on new construction.

2. Modifying the sites, buildings, and interiors to be accessible to the handicapped where feasible.

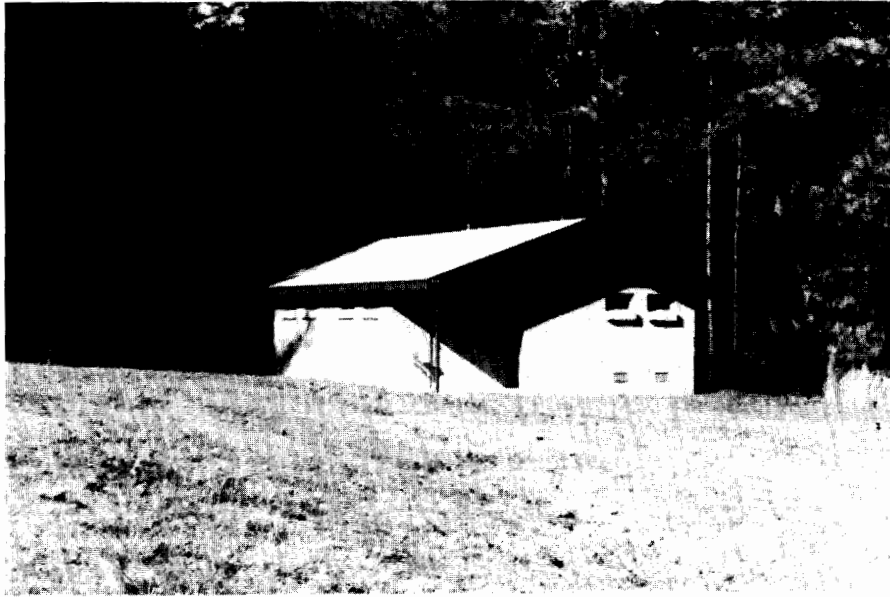
3. Providing doors and windows which discourage and are resistant to vandalism.
4. Provide landscaping to add to the visual appeal of the structure.
5. Enlarge structures as determined to be necessary.
6. Repair or replace any plumbing, electrical, interior finishes and fixtures as required.
7. Surface pedestrian access paths to the structures.

Photo/Figure 8-03 shows an existing washhouse at John H. Kerr Reservoir. The sketch depicts an example of the appearance of that structure after rehabilitation. The rehabilitation efforts of the exterior include placing roofing and siding on the exterior which is similar to other project structures, adding a walkway to the structure, and providing landscaping plus any necessary changes to the interior of the building.

Photographs 8-04 and 8-05 show the results of rehabilitating an existing structure at Lake Lanier in the Mobile District. Although the building and roof design will vary with those at John H. Kerr Reservoir, the building treatment and landscaping will be similar.

L. Shoreline Stabilization. Erosion protection is needed in many areas of the shoreline at John H. Kerr Reservoir. Protection is especially needed where the shore is highly visible and/or where the water has already severely eroded the bank. Increasing the grades at the shoreline results in less surface area for erosion to take place and provides a more constant, stable, and a attractive bank. Examples of good shore stabilization techniques include placing interlocking rip-rap on the bank, placing gabions as a wall to retain soil and resist wave action along the bank, or constructing walls of stone along the shore where wave action takes place. Planting a water tolerant ground cover with extensive root systems to hold the soil in place will successfully prevent erosion in less critical areas. Photograph 8-06 displays an area of shoreline erosion at John H. Kerr Reservoir and the photograph 8-07 depicts an example of shoreline protection with the use of gabions in a situation similar to the above photograph. It is recommended that a more comprehensive study of shoreline erosion be done and that a plan for shoreline stabilization be adopted.

M. Facilities for the Elderly and Handicapped. During the Feature Design Memorandum stage, certain existing areas may be designated as areas for use by elderly and handicapped. In such areas, existing facilities should be adapted to the standards discussed in Exhibit A, "Facilities for the Elderly and Handicapped."



PHOTOGRAPH 8-03
EXISTING WASHHOUSE

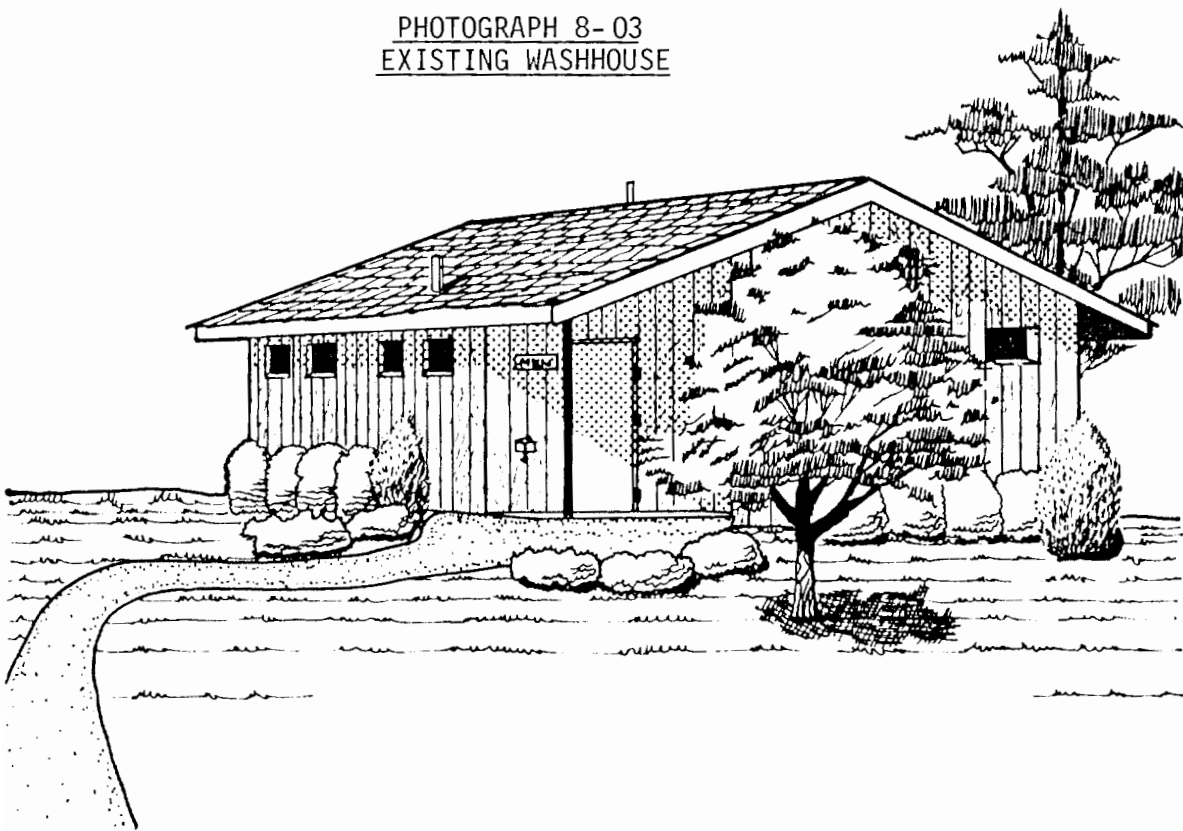
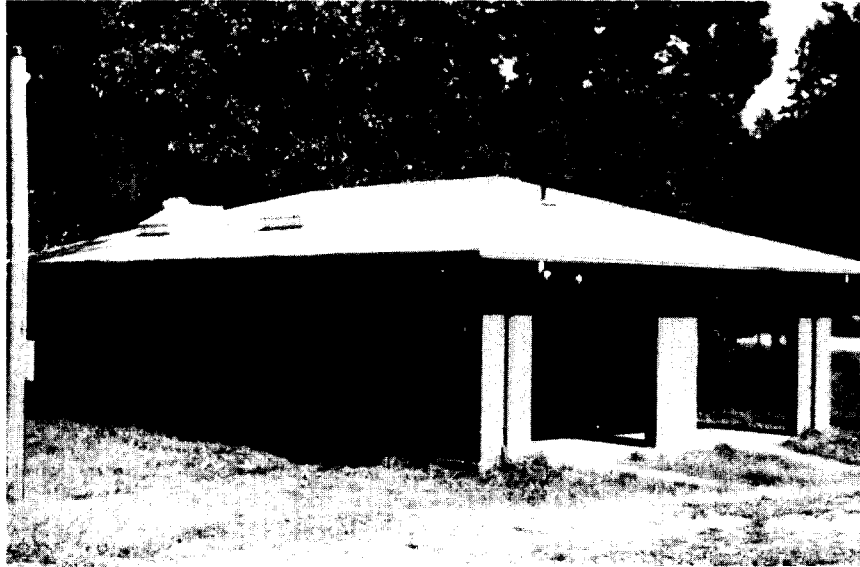


FIGURE 8-03
REHABILITATION OF A PROJECT STRUCTURE*

*Depicts the rehabilitation of the exterior of an existing structure. Structures will vary in style and must be studied individually to determine extent of rehabilitation necessary.



PHOTOGRAPH 8-04
EXISTING CONCRETE BLOCK STRUCTURE



PHOTOGRAPH 8-05
TYPICAL REHABILITATION OF PROJECT STRUCTURE



PHOTOGRAPH 8-06
EXAMPLE OF SHORELINE EROSION PROBLEM
AT JOHN H. KERR RESERVOIR



PHOTOGRAPH 8-07
EXAMPLE OF SHORELINE PROTECTION WITH
GABIONS AT A PROJECT SIMILAR TO JOHN H. KERR RESERVOIR

CHAPTER 9

RESOURCE MANAGEMENT GUIDELINES

9-01 INTRODUCTION

In accordance with ER 1120-2-400 and ER 1130-2-400, the master plan should establish broad management guidelines and policies which will form the basis for preparing a number of detailed management appendices. Therefore, this chapter will not provide specific implementation procedures for administering or operating John H. Kerr Reservoir. However, recommendations are included to guide the development of effective policy pertaining to the management of all project resources.

This chapter is divided into five sections which correspond to five management appendices to be prepared at a later date. These sections include: (1) Project Resource Management, (2) Forest, Fish, and Wildlife Management, (3) Fire Protection, (4) Project Safety and (5) Lakeshore Management.

The major objectives of the five detailed management appendices are:

- A. To provide development and management procedures that are responsive to the specific characteristics and needs of the John H. Kerr Dam and Reservoir project.
- B. To increase the value of project lands and waters for fish, wildlife and outdoor recreation; and to promote natural ecological processes by following accepted conservation practices.
- C. To protect all project lands and waters from damage caused by natural or man induced forces, including fire, insect or disease outbreaks, pollution, encroachment, etc.
- D. To provide safe public access to both land and water areas and to provide for diverse recreational opportunities.
- E. To protect the lakeshore's visual quality and natural resource conditions and to promote the safe and healthful use of these shorelines for public recreation.

9-02 PROJECT RESOURCE MANAGEMENT PLAN

A. Introduction. John H. Kerr Reservoir is administered by the Wilmington District, Corps of Engineers. In addition, certain lands are leased, managed, and operated by the North Carolina Department of Natural Resources and Community Development, and the Commonwealth of Virginia Office of Commerce and Resources. The Corps is responsible for operation of the project for its primary purposes, for operation of recreation areas under its jurisdiction, and for defining administrative policy for management of its land and water resources. The management of land and water areas by the state of North Carolina and the Commonwealth of Virginia is accomplished under leases for recreation purposes and for fish and wildlife management. The location of all operations and maintenance facilities at the reservoir are shown on the Operations and Maintenance Map (Plates 9-01 and 9-02).

B. General. The Resource Management Plan will be prepared following the guidelines set forth in ER 1130-2-400, and when completed, will be attached as Appendix A to this Master Plan Update. Due to the nature of the cooperative arrangement between the Corps of Engineers and the states of North Carolina and Virginia, the states will work with the Corps in the development of management and operational policies for John H. Kerr Reservoir. These policies should support the primary project purposes of flood control and hydroelectric power generation. Other associated project purposes include the regulation of riverflow for subsequent hydroelectric plants and navigation, as well as the provision of public recreational opportunities.

C. Scope. The Resource Management Plan for John H. Kerr Reservoir will include a discussion of the authorized purpose of the project, operational concepts, land acquisition policy, staffing and organization, status of public use areas, administrative facilities, maintenance and management programs, administrative activities, cooperative activities with other agencies, encroachments, and other related items as specified in ER 1130-2-400.

D. Annual Work Plan. The Resource Manager will prepare annual work plans to implement the necessary on-the-ground work required to fulfill the Corps management procedures described in the Resource Management Plan. These work plans will include such items as equipment and materials needed, manpower requirements, budgetary requirements, dates and plans for starting and completing each task, and other data that will be needed to implement the plan.

E. Resource Management Plan Revision. Recognizing the constantly changing patterns of user preference and the rapid technological developments in the recreation field, the Resource Management Plan will be reviewed annually by the Resource Manager and necessary changes will be

made to keep it current. In accordance with ER 1120-2-400, the management plan will be updated every five years and submitted to the Corps' Division office for approval.

9-03 FOREST, FISH, AND WILDLIFE MANAGEMENT PLAN

A. Authority and Purpose. In accordance with ER 1130-2-400, ER 1165-2-400, paragraphs 36 of ER 405-2-835, and Appendix A of ER 1130-2-400, a Forest, Fish and Wildlife Management Plan will be prepared as Appendix B to this Master Plan Update for John H. Kerr Reservoir. The purpose of this plan will be to establish specific implementation techniques for fish, wildlife, and forest resource enhancement and conservation.

B. Forest Management

1. General. The forest management program at John H. Kerr Reservoir will emphasize protection and management of the resources to enhance wildlife habitat, improve recreational opportunities, and protect the watershed. The forest management component of the Forest, Fish, and Wildlife Management Plan will build on the groundwork established in the vegetation study included in the Environmental Inventory and Analysis (Appendix G) and serve as a guide for the development and improvement of the forest resources of the project. It will identify the major forest associations and types, and suggest specific, prioritized techniques that will be implemented to further enhance existing forest conditions. Adequate guidelines will be provided to allow formulation of detailed forest management plans.

2. Scope of Forest Management. The Forest, Fish, and Wildlife Management Plan will:

- a. Identify management activities that will help to conserve the long-term viability of the forest lands within the project area by maintaining a healthy and diverse forest environment, protected from insect vectors, pathogens, and wildfires.
- b. Identify specific reforestation and landscaping activities that will be undertaken to improve the overall visual character of the project; especially in areas with substantial recreation use opportunities.
- c. Establish procedures that will insure the conservation, preservation, and enhancement of the forest resources at John H. Kerr Reservoir.

*Implied water
in & no
fish from
reservoir*

- d. Identify techniques to enhance wildlife habitat through manipulation of forest resources.
- e. Identify forest management techniques that will insure that watershed protection capabilities are enhanced and that erosion and sedimentation are minimized.
- f. Identify any unique forest lands within the project area and the necessary actions to preserve these areas.
- g. Identify opportunities for public access and educational programs in forested areas where the resources would not be adversely affected.

h. Identify techniques for informing project visitors of sound conservation and forest management activities.

3. General Objectives. The general objective of forest management will be to attain a diverse, ecologically healthy forest in which a variety of activities can take place with minimal impact. Forest resources will be managed to maximize their aesthetic, ecological, wildlife habitat, and recreational values. Consideration will be given to management techniques intended to provide diverse vegetative environments, quality wildlife habitat, environmental protection, aesthetic enhancement of project lands, and the reduction of hazards resulting from fire, insect infestation, and disease.

The development of detailed policies and procedures, and the recommendation of forest management techniques is beyond the scope of this section. However, general guidelines for the management of the forest in various land allocation categories can be suggested as described below.

a. Intensive Use Recreation Lands. The potential for adverse impacts resulting from public use is relatively high on these areas. Forested areas within Intensive Use Recreation Lands will be managed to reduce hazards to visitors, reduce impacts to the forest from those visitors, to provide maximum aesthetic enjoyment, and to provide for utilitarian needs such as screening and shade.

b. Low Density Recreation Lands. These lands will be managed to facilitate human access and use, maintain a variety of wildlife, and to serve as a buffer between incompatible uses. The forest ideally will represent a spectrum of successional stages to assure a diversity of vegetation and habitat at John H. Kerr Reservoir.

c. Wildlife Management/Reserve Forest Land. The objective of forest management in these areas will be to perpetuate a healthy, ecologically, sound forest in which succession toward climax can occur without danger from insects, disease, or fire. Tree removal will be limited to that necessary for disease or insect control, public safety, forest management, or wildlife management, *Maintenance of ~~the~~ floodways for access to stream inflow without ~~causing~~ restriction to the project and water management practices*

Management of the forest in wildlife areas will have its top priority the achievement of diverse habitats for a variety of game and non-game wildlife species. Practices will include cutting, planting, and thinning, and will be done under the guidance of a wildlife biologist. Although such management will have a major impact on the natural successional processes of the forest, it is important that species composition and location, the location and shape of openings, and edge treatment be designed to create an aesthetically pleasing environment. *other factor*

prevention of flooding - due to restriction of inflow, causing a rise in flood elevation

4. Monitoring Program and Plan Review. A forest resource monitoring program will be designed and implemented to record the impact of various land use activities on plant communities. The results of this monitoring program will be helpful in making planning and management decisions in the future, and in detecting areas endangered by over utilization, depletion, or depreciation.

The Forest, Fish, and Wildlife Management Plan will be reviewed by the Resource Manager on a yearly basis and updated every five years as necessary to reflect changes required to realize current project objectives.

C. Fish and Wildlife Management

1. General. A Fish and Wildlife Habitat Development and Maintenance Plan will be prepared for the project as part of Appendix B to this Master Plan Update. John H. Kerr Reservoir will provide an environment which is capable of sustaining a diversity of fish and wildlife species. It is important that these resources be protected and enhanced so that the public may derive optimum benefits associated with such activities as fishing, hunting, nature study, and photography. The Environmental Inventory and Analysis (Appendix G) will be used as a major source of data to prepare this plan.

The Fish and Wildlife Management Plan must be coordinated with other management plans including forest management, public use area development and maintenance, and interpretive programs. The plan will be based on the data collected for the Environmental Inventory

and Analysis and will develop a program for the management of fish and wildlife resources on the project.

2. Purpose. The Fish and Wildlife Plan will discuss in detail the various techniques that are to be implemented in the management of the project's fish and wildlife resources.

3. Objectives. The major objectives of the fish and wildlife management program are:

- a. To preserve, enhance, and maintain suitable habitat conditions necessary for optimum fish and wildlife propagation while maintaining an appropriate ecological balance.
- b. To provide increased recreational opportunities through both consumptive and nonconsumptive use of fish and wildlife resources.
- c. To protect native fish and wildlife populations from excessive exploitation, overharvest, and environmental degradation.
- d. To manage the fish and wildlife resources to obtain maximum benefits commensurate with the reservoir's primary function of flood protection, water quality control, water supply and recreation.
- e. To coordinate the fish and wildlife enhancement plan with other activities such as forest management, recreation area development, and interpretive programs.

D. Monitoring Program. The Forest, Fish, and Wildlife Management Plan will identify techniques that could be implemented to monitor the positive and/or negative effects of various management techniques. Data on fishing and hunting demand, harvest, population structure, and productivity will be collected and analyzed. Information obtained from these studies will be utilized by the Corps and cooperating agencies to guide present management programs and to formulate additional projects.

9-04 FIRE PROTECTION PLAN

A. Authority and Scope. A Fire Protection Plan will be prepared for John H. Kerr Reservoir to serve as a guide for the Resource Manager and the states in the prevention, pre-suppression, and suppression of forest and grassland fires; and to describe safe burning techniques to be used to improve wildlife habitat and forest stand conditions. The plan will be prepared under separate cover as Appendix C to this Master Plan Update.

B. General. The Fire Protection Plan will establish policy with regard to the control and suppression of fires at John H. Kerr Reservoir. Included in the plan will be provisions and guidelines related to equipment needs, training of personnel, visitor education and awareness, and fire response procedures. Cooperative agreements will be established with local community fire departments and procedures for making contact with these groups will be established. Policies and procedures will be adopted for controlled burning if it should be deemed desirable for habitat improvement of forest land management. The plan will establish a fire hazard index system based on prevailing weather conditions and a program of use restrictions base on these conditions. The fire protection plan will also examine any special fire hazards that may be identified at Kerr Reservoir and adopt techniques for reducing these hazards.

The entire project area must be made accessible to fire fighting equipment via roads, trails, and well access roads. A schedule of periodic checking of these fire lanes should be established to assure continued access to all areas. Facility design will take into account reduction of fire hazard especially in the provision of grills and cooking areas and in providing places for campfires.

C. Fire Protection Plan Revision. In order to keep the plan updated, the Resource Manager will make minor changes in this plan on a day-to-day basis, and will review the entire plan annually and make the necessary revisions.

In accordance with ER 1120-2-400, the plan will be comprehensively reviewed and updated every five years and submitted to the Division for approval. A draft of the updated plan will be submitted to the District Office two months prior to the submittal date to SAD.

9-05 PROJECT SAFETY PLAN

A. Authority and Scope. A Project Safety Plan will be prepared for John H. Kerr Reservoir to insure maximum safety to the public and staff with regard to maintenance and operation of the dam and all project facilities. The plan will be prepared under the guidelines established in EM 381-1-1. The Project Safety Plan will be prepared, under separate cover, as Appendix D to this Master Plan Update. The safety plan will address accident prevention, equipment, facilities, operations procedures, water safety, and health and safety standards.

B. Objective. The objective of the safety program will be to provide a safe environment for project personnel and the visiting public, and to prevent damage from accidents or fires. The Resource Manager will fully coordinate the implementation of this plan with all parties having management responsibility on the reservoir.

C. General Program Guidelines. Program guidelines will be established for the major areas of project operation. Project personnel will receive training to include first aid, emergency procedures, identification of safety hazards, and the proper handling of equipment, materials, and chemicals. Contractors working on the project will be required to have similar education and training programs for their employees.

Standards and procedures will be outlined to provide safe conditions throughout the project area. These will include basic controls for the safe movement of pedestrians, vehicles, and boats and an inspection procedure to insure that safety hazards are identified or corrected. Also, minimum health and safety standards will be established for concessionaire facilities, restrooms, maintenance areas and all other facilities.

Particular emphasis will be placed upon preparing a visitor education program which outlines safe boating and swimming procedures, the public distribution of printed material describing these procedures, and the posting of appropriate signs identifying restricted areas or specific areas requiring any specific safety practices. A plan which describes the public information and education program is also necessary to insure that visitors are aware of all safety rules, potential hazards and emergency assistance procedures. This program will include the use of signs, printed material, news media and instruction by qualified project personnel.

D. Staff Requirements. The Project Safety Officer, appointed in accordance with paragraph 8b of ER 1130-2-400, will develop plans and programs designed to implement and enforce pertinent provisions of EM 385-1-1, as well as regulations in the 385 series and requirements related to accident prevention. Basically, such planning will encompass two general areas: (1) contractor and Corps employees; and (2) programs designed to provide a hazard free environment for the visiting public. The Project Safety Officer will maintain close liaison with the District Safety Officer.

E. Implementation and Plan Revisions. The plan will be prepared under the direction of the resource manager. It is essential that the plan be coordinated between all agencies responsible for project land: this plan should be a joint venture with all responsibilities defined. Where there are overlapping safety responsibilities which could be more effectively administered jointly, such provisions should be made.

In order to maintain the Project Safety Plan as a current and useful management tool, changes will be made on a day-to-day basis as required. A comprehensive review and updating of the plan for SAD approval will be done on a five-year cycle in accordance with

ER 1120-2-400. A draft of the revised plan will be sent to the District Office two months prior to the submission date to SAD.

9-06 LAKESHORE MANAGEMENT PLAN

A. Authority and Purpose. It is the policy of the Corps of Engineers to manage and protect the shorelines of all lakes under its jurisdiction to properly establish and maintain acceptable fish and wildlife habitat, aesthetic quality and natural environmental conditions and to promote the safe and healthful use of these shorelines for recreational purposes by all of the American people.

In accordance with ER 1130-2-406 a Lakeshore Management Plan will be prepared for John H. Kerr Reservoir and included as Appendix F to the Master Plan Update. The purpose of this plan will be to establish guidelines and procedures for all development and use of the project shoreline.

B. Scope. The Plan will consist of an area allocation map, related rules and regulations, a time-phase definitive objective plan for managing the lakeshore, descriptions of recreational waste management systems and sanitary facilities, and other information pertinent to the effective management of the lakeshore. Activities on land areas which affect the lakeshore, as well as activities on the water areas will be addressed in the Lakeshore Management Plan.

C. Allocation Considerations. The primary objective of the Lakeshore Management Plan will be the protection of project land and waters for (1) project purposes, (2) environmental protection, (3) public safety, and (4) public use and enjoyment.

The Lakeshore Management Plan will develop specific criteria for the allocation of shoreline classifications based on, but not limited to, the following considerations:

- a) Location of project structures and operations facilities;
- b) Location of navigation hazards;
- c) Areas of rapid de-watering or severe wind/wave exposure;
- d) Threats to fish and wildlife habitat and/or water quality;
- e) Slope along the shoreline, soil stability, vegetation cover;

- f) Effects of lakeshore use on shoreline aesthetics;
- g) Use of adjacent lands for public recreation, quasi-public lease, or commercial concession;
- h) Historic and archaeological values;
- i) Areas adjacent to bridges, road crossings, utility lines, and railroad crossings.

CHAPTER 10

COST ESTIMATES

10-01 SUMMARY OF ESTIMATED COSTS

The cost estimates for development and rehabilitation of recreation facilities at John H. Kerr Dam and Reservoir are very general. The costs reflect the basic development and rehabilitation costs. A summary of the detailed itemized cost estimate for each site are shown in Table 10-01.

10-02 FACILITY COSTS

A. Facilities at Existing Corps Operated Areas and Future Cost-Shared Areas. Proposed development at existing Corps of Engineers managed and operated areas and at future cost shared areas are shown on the orthophoto site plans in bubble form to allow flexibility of design during Feature Design Memorandum preparation. The cost items which are included in these bubbles are summarized in Table 10-02 through 10-10. These items are further defined in Chapter 8, Exhibit A, and in Section 10-03 of this Chapter. Lump sum costs for these development bubbles (based on the items in Tables 10-02 to 10-10) are shown in Table 10-11.

The costs for relocating, rehabilitating, and converting existing facilities are summarized in Table 10-12.

Table 10-13 summarizes the relocation, conversion, and rehabilitation of existing Corps operated areas at John H. Kerr Reservoir. These quantities will be used to determine the cost estimates for these areas.

Quantities related to the development bubbles for future cost shared areas are summarized in Table 10-14. The facilities in this Table refer to the facility bubbles defined in Tables 10-02 through 10-10.

B. Facilities at Areas Operated by the State of North Carolina. The developments proposed by the State of North Carolina do not conform to the facility bubble descriptions discussed in this plan. Therefore, proposed developments for North Carolina State Parks have been summarized in Tables 10-15 to 10-23.

C. Facilities at Areas Operated by the Commonwealth of Virginia. The Commonwealth of Virginia has not developed future plans for their state parks. The development shown on the site plans for Oconeechee State Park is a concept utilizing the Panhandle Peninsula as a wilderness area. The cost for this development is summarized in Table 10-24.

D. Inter-Site Trails. All inter-site trails are shown on the Interpretive Features Map and are summarized for cost estimate purposes in Table 10-25. These trails have been costed separately to allow flexibility of cost arrangements available to the agencies which the trails will serve.

10-03 BREAKDOWN OF UNIT COST ITEMS

Items included in the compilation of unit costs for basic facilities listed in Tables 10-02 to 10-10.

- A. 20' Access Road (4' shoulders)
Clearing and grubbing 40' wide
Excavation and rough grading
Subgrade, ditches and shaping shoulders
6" Gravel base 28' wide
2" Bituminous surface 20' wide
Culvert, end sections and ditching (1 culvert per 100' of road)
Finish grade-ditches, slopes-topsoil and seeding
- B. 18' Two Way Circulation Road (3' shoulders)
Clearing and grubbing 30' wide
Excavation and rough grading
Subgrade, ditches and shaping shoulders
6" Gravel base 22', 2" Bituminous surface 18' wide
Culvert, end sections and ditching (1 culvert per 100' of road)
Finish grade-ditches, slopes-topsoil and seeding
- C. 12' One Way Circulation Road (2' shoulders)
Clearing and grubbing 24' wide
Excavation and rough grading
Subgrade, ditches and shaping shoulders
6" Gravel base 16' wide
2" Bituminous surface 12' wide
Culvert, end sections and ditching (1 culvert per 100' of road)
Finish grade-ditches, slopes-topsoil and seeding
- D. 10' Service Road (2' shoulders)
Clearing and grubbing 20' wide
Excavation and rough grading
Subgrade, ditches and shaping shoulders
6" gravel surface 14' wide
Culvert, end sections and ditching (1 culvert per 100' of road)
Finish grade ditches, slopes, topsoil and seeding

- E. Parking
Clearing and grubbing
Excavation and rough grading
6" Gravel base
2" Bituminous Surface
Curb (railroad tie, concrete wheel stop, or sim.)
Finish grading-topsoil, seeding
Drainage structures
- F. Boat Launch Ramp
Clearing and grubbing
Excavation and rough grading
6" Gravel base
6" Reinforced concrete (12' x 215')
6' Concrete curb on both sides of each lane
Finish grade, topsoil, seeding, etc.
Rip-rap where necessary
- G. Marina
Clearing and grubbing
Excavation and grading
Sea Wall
Floating docks
Covered docks
Concession building
Service Area
Service Ramp
Maintenance Building
Dry boat storage building
Paved walkways, seeding, landscaping, etc.
Utilities
- H. Camp Unit-Tent/Trailer
Clearing, grubbing, and grading
Parking spur (12' x 70')
6" Gravel base and 2" Bituminous surface
Contained gravel impact area (approximately 800 sq. ft.)
Picnic table with benches
Fire ring or upright grill
One lantern post
Trash can and holder
Site identification marker
Water and electrical hookups (Class A units)
- I. Camp Unit-Primitive
Clearing and grubbing tent space
Contained gravel impact area (approx. 650 sq. ft.)
Picnic table
Fire circle
Lantern post

- J. Group Camp Area
Clearing, grading, and seeding
- K. Camp Area Amphitheater
Clearing and grubbing
Bench seating
Walkways
1 Projector screen
1 Projector pad with electric outlet
3 Trash receptacles with holders
1 Council fire ring
- L. Picnic Unit
Clearing and grading
Concrete wearing pad (10' x 10')
Contained gravel impact area (400 sq. ft.)
Grill
Picnic Table
1/3 Trash container and holder
Seeding
- M. Picnic Shelter
Clearing and grubbing
Finished concrete floor
Picnic tables
Structure
1/2 Grill and 1/2 trash container per table
- N. Swimming Beaches
Clearing and grubbing
Excavation and grading
12" sand surface
Guard Tower
Storm drainage
Safety buoys
Seeding of Turf areas
Concrete curb to contain sand
Diversion berm
- O. Playgrounds
Clearing, grubbing, and grading
Play structures
Playground surface (sand, shredded bark, turf, etc.,
contained by railroad ties.)
Park Benches
Trash receptacles
Seeding and landscaping

P. Trails

Clearing, grubbing, and grading

Specified surface

Drainage structures (culverts)

Steps, bridges, handrails and trail signs

Trailside rest area for each 2 miles of trail to

include 2 park benches and 90 sq. ft. gravel impact area

Q. Recreation Area Structures

Clearing and grubbing

Excavation and grading

Cost of Structure

Utilities within 5 feet of the structure

TABLE 10-01

COST ESTIMATE SUMMARY
BY SITES

SITE NO.	SITE NAME	REHABILITATION COSTS	FUTURE COST SHARING	OTHER-STATES OR CONCESSIONAIRE	FUTURE 100% CORPS ²
<u>Existing COE Operated Areas</u>					
2	Palmer Point	120,000	0	0	0
20	Ivy Hill	162,000	0	0	0
21	Island Creek	31,000	120,000	0	0
26	Grassy Creek	52,000	5,000	0	0
29	Longwood	264,000	95,000	0	0
33	Buffalo Springs Wayside	3,000	0	0	0
34	Buffalo	42,000	120,000	0	0
38	Staunton View	0	0	0	0
40	Bluestone Landing	21,000	53,000	0	0
47	Rudds Creek	311,000	0	0	0
49	Eagle Point Landing	24,000	0	0	0
52	Eastland Creek	82,000	0	0	0
54	North Bend Park	637,000	0	0	1,200,000 ²
55	Tailrace Access	31,000	23,000	0	0
66	Clarksville Overlook	50,000	163,000	0	0
	TOTAL	1,830,000	579,000	0	1,200,000
<u>North Carolina State Parks</u>					
4	Kimball Point	526,000	119,000	0	
5	County Line Park	779,000	1,117,000	600,000	
8	Bullocksville Park	695,000	1,525,000	450,000	
10	Satterwhite Point	1,295,000	281,000	0	
11	Nutbush Creek	464,000	211,000	0	
12	Williamsboro Wayside	0	93,000	0	
14	Townsville Landing	328,000	1,444,000	0	
15	Hibernia	743,000	988,000	875,000	
16	Henderson Point	571,000	199,000	0	
	TOTAL	5,401,000	5,977,000	1,925,000	

TABLE 10-01 (CONT'D)

COST ESTIMATE SUMMARY
BY SITES

SITE NO.	SITE NAME	REHABILITATION COSTS	FUTURE COST SHARING	OTHER-STATES OR CONCESSIONAIRE	FUTURE 100% CORPS ²
<u>Virginia State Parks</u>					
43	Occoneechee State Park	0	0	191,000	
57	Hyco Landing	0	0	0	
61	Clover Landing	0	0	0	
	TOTAL			191,000	
<u>Proposed Recreation Areas</u>					
1	South Dike Park	0	354,000	0	
3	Keats Peninsula	0	1,295,000	0	
17	Long Grass Point	0	651,000	0	
19	Walnut Hill	0	131,000	0	
25	Garretts Woods	0	1,517,000	0	
27	Turtle Head Peninsula	0	107,000	0	
28	Buchanan's Woods	0	84,000	0	
30	Soudan Landing	0	535,000	0	
35	Viking Hills Park	0	554,000	0	
39	Bluestone Park	0	254,000	0	
44	Oakleaf Point	0	1,417,000	0	
45	Butchers Bayview	0	1,125,000	0	
46	Holly Grove	0	324,000	0	
48	Boydton Landing	0	1,643,000	0	
50	Newman Point	0	315,000	0	
53	Inglewood	0	533,000	0	
48Q	Future Lease Site ³	0	-	0	
	Inter-Site Trails	0	135,000	0	
	TOTAL		10,974,000		

¹The Commonwealth of Virginia has not developed future plans for Occoneechee State Park. Goals for future recreation development are presented in the Master Plan text.

The proposed development shown for this area illustrates the concept for future use of the Panhandle Peninsula as a "wilderness unit" of the state park.

²The \$1,200,000 is the estimated cost for a Visitor Center and Resource Manager's office.

³This site is proposed for development by a Quasi-Public Group. The nature of the development will be determined by the leasee.

TABLE 10-02
COST ESTIMATE ITEMS

<u>BOAT LAUNCH AREA</u> ITEM	UNIT COST	UNIT	LANES		
			1**	1*	2
			No. of Units		
Two Way Circulation Road	20	L.F.	800	800	950
Paved Car-Trailer Parking Spaces	10	S.Y.	0	1855	3711
Launch Lane @ 215' Long	56	L.F.	215	215	430
Boat Courtesy Dock	15,000	EA.	1	1	1
Information Sign	50	EA.	1	1	1
Information Bulletin Board	100	EA.	1	1	1
Restroom (Flush)	40,000	EA.	0	0	1
2" Water Line	9.50	L.F.	0	0	950
Electric Line	4.50	L.F.	800	800	950
Electric Area Lights	1,300	EA.	1	1	1
Seeding and Landscaping	5,000	AC.	1	1	1.5
Sewage Treatment	6	GAL.	0	0	1000
TOTAL COST			\$53,090	\$71,640	\$163,440

*1 lane designation is only intended as an expansion of an existing boat launching area.

**One lane without parking to serve areas such as camping areas where trailers may be stored at camp sites.

TABLE 10-03

COST ESTIMATE ITEMS

<u>CLASS A CAMPING AREA</u>			<u>Sites</u>		
<u>Item</u>	<u>Unit Cost</u>	<u>Unit</u>	<u>10*</u>	<u>25*</u>	<u>50</u>
			<u>No. of Units</u>		
Two Way Circulation Road	20	L.F.	800	1750	3500
Campsite with Electric & Water Hookup	1,700	EA.	10	25	50
Open Play Area	6,000	AC.	0	1	2
Playground	7,000	EA.	0	0	1
Washhouse	70,000	EA.	0	0	1
Comfort Station	40,000	EA.	0	1	1
Well House with Tank	12,500	EA.	0	1	1
Sewage Treatment	6	GAL.	960	2400	4800
Control Booth	8,700	EA.	0	1	1
Sanitary Dumping Station	20,000	EA.	0	1	1
2" Water Line	9.50	L.F.	800	1750	3500
Amphitheater	25,000	EA.	0	0	1
Electric Area Light	1,300	EA.	1	2	3
Electric Line	4.50	L.F.	800	1750	3500
Seeding and Landscaping	5,000	AC.	2	4	8
Fishing Dock	15,000	EA.	0	0	1
Entrance Sign	3,300	EA.	0	0	1
Information Sign	50	EA.	1	1	2
TOTAL COST			\$61,310	\$226,250	\$490,300

*The 10 unit designation is only intended as an extension of an existing camping area. The 25 unit designation is typically applied within camping areas where developments may be physically separated from other units within the recreation area boundaries and only represents a portion of the total camping area.

TABLE 10-04

COST ESTIMATE ITEMS

<u>CLASS B CAMPING AREA</u>			Sites		
Item	Unit Cost	Unit	10*	25* No. of Units	50
Two Way Circulation Road	20	L.F.	800	1750	3500
Campsite without Utilities	1,200	EA.	10	25	50
Open Play Area	6,000	AC.	0	1	2
Playground	7,000	EA.	0	0	1
Washhouse	70,000	EA.	0	0	1
Comfort Station	40,000	EA.	0	1	1
Wellhouse with Tank	12,500	EA.	0	1	1
Sewage Treatment	6	GAL.	800	2000	4000
Control Booth	8,700	EA.	0	1	1
Sanitary Dumping Station	20,000	EA.	1	1	1
2" Water Line	9.50	L.F.	800	1750	3500
Amphitheater	25,000	EA.	0	0	1
Electric Area Lights	1,300	EA.	1	2	3
Electric Line	4.50	L.F.	800	1750	3500
Hydrant/Fountain	1,200	EA.	2	3	4
Seeding and Landscaping	5,000	AC.	2	4	8
Fishing Dock	15,000	EA.	0	0	1
Entrance Sign	3,300	EA.	0	1	1
Information Sign	50	EA.	1	1	2
TOTAL COST			\$77,750	\$218,250	\$465,300

*The 10 unit designation is only intended as an extension of an existing camping area. The 25 unit designation is typically applied within existing camping areas where developments may be physically separated from other units within the recreation area boundaries and are only a portion of the total camping areas.

TABLE 10-05

COST ESTIMATE ITEMS

<u>PRIMITIVE CAMPING AREA</u>		<u>Sites</u>	
<u>Item</u>	<u>Unit Cost</u>	<u>Unit</u>	<u>No. of Units</u>
Two Way Circulation Road	20	L.F.	300'
Gravel Service Road	9	L.F.	2000
Primitive Camp Unit	400	EA.	20
Pair Pit Toilet (includes centralized trash containers)	8000	EA.	2
Car Parking Spaces	10	S.Y.	710
Boat Mooring Posts	15	EA.	20
Barricade Gate	200	EA.	1
Hiking Trails (for circulation within site)	1	L.F.	4000
Entrance Sign	3,300	EA.	1
Information Sign	50	EA.	1
TOTAL COST			\$62,950

TABLE 10-06

COST ESTIMATE ITEMS

<u>GROUP CAMP AREA</u>	Unit Cost	Unit	<u>Small</u> <u>No. of</u>	<u>Large</u> <u>Units</u>
Two Way Circulation Road	20	L.F.	500	500
Paved Car Parking Spaces	10	S.Y.	355	1066
Entrance Sign	3,300	EA.	1	1
Information Sign	50	EA.	1	1
Pair Pit Toilets (includes centralized trash containers)	8,000	EA.	1	4
Water Well with Hand Pump	1,500	EA.	1	1
Council Group Area (Fire Circle & Log Seats)	1,000	EA.	0	1
Seeding and Landscaping	5,000	AC.	.5	1
Electric Area Lights	1,300	EA.	1	1
Electric Line	4.50	L.F.	500	500
TOTAL COST			\$32,450	\$67,060

TABLE 10-07

COST ESTIMATE ITEMS

<u>PICNIC AREA</u> Item	Unit Cost	Unit	Sites			
			10*	25 No. of Units	50	75
Two Way Circulation Road	20	L.F.	300	600	1200	1800
Paved Car Parking	10	S.Y.	355	888	1777	2664
Overflow Parking	3	S.Y.	0	0	222	444
Entrance Sign	3,300	EA.	0	1	1	1
Information Sign	50	EA.	1	1	2	3
Picnic Unit	455	EA.	10	25	50	75
Hydrant/Fountain	1,200	EA.	1	2	5	8
Picnic Shelter	10,000	EA.	0	0	1	2
Comfort Station	40,000	EA.	0	1	1	1
Sewage Treatment	6	GAL.	225	560	1120	1680
Open Play Area	6,000	AC.	0	1	2	2
Playground	7,000	EA.	0	1	1	1
Electric Area Lights	1,300	EA.	1	2	4	6
Electric Line	4.50	L.F.	300	600	1200	1800
2" Water Line	9.50	L.F.	300	600	1200	1800
Wellhouse with Tank	12,500	EA.	0	1	1	1
Seeding and Landscaping	5,000	AC.	.25	.5	1	1.5
TOTAL COST			\$23,450	\$120,365	\$189,806	\$253,227

*The 10 unit designation is only intended as an extension of an existing picnic area.

TABLE 10-08
COST ESTIMATE ITEMS

<u>BEACH AREAS</u>				
<u>Item</u>	<u>Unit Cost</u>	<u>Unit</u>	<u>Minor No. of Units</u>	<u>Major Units</u>
Two Way Circulation Road	20	L.F.	750'	750'
Paved Car Parking Spaces	10	S.Y.	533	4444
Entrance Sign	3,300	EA.	0	1
Information Sign	50	EA.	1	1
Information Bulletin Board	1,000	EA.	0	1
Beach Area	7	S.Y.	2222	5555
Bathhouse	300,000	EA.	0	1
Comfort Station	40,000	EA.	1	0
Sewage Treatment	6	GAL.	1800	9600
Electric Area Lights	1,300	EA.	2	4
Electric Line	4.50	L.F.	750	1500
Seeding and Landscaping	5,000	AC.	1	2
Playground	7,000	EA.	0	1
Paved Walks	3	L.F.	200	500
2" Water Line	9.50	L.F.	600	1500
Hydrant/Fountain	1,200	EA.	0	2
Well House with Tank	12,500	EA.	0	1
TOTAL COST			\$104,009	\$519,875

TABLE 10-09
COST ESTIMATE ITEMS

FISHING AREA

<u>Item</u>	<u>Unit Cost</u>	<u>Unit</u>	<u>No. of Units</u>
Two Way Circulation Road	20	L.F.	200'
Paved Car Parking	10	S.Y.	888
Comfort Station	40,000	EA.	1
Fish Cleaning Station	3,000	EA.	1
Fishing Dock	15,000	EA.	1
Paved Trail	3	L.F.	400'
Information Sign	50	EA.	2
Electric Area Light	1,300	EA.	1
Electric Line	4.50	L.F.	400'
Water Line	9.50	L.F.	400'
Well House with Tank	12,500	EA.	1
Sewage Treatment	6	GAL.	900
TOTAL COST			\$96,980

TABLE 10-10
COST ESTIMATE ITEMS

UNIQUE FACILITIES

Unique facilities or other facilities which extend beyond the specific site development areas.

	<u>Unit Cost</u>	<u>Unit</u>
20' Paved Access Road	24	L.F.
Visitor Center/Resource Manager's Office	1,200,000	L.S.
High Voltage Electric Distribution Line	16	L.F.
Marina (The COE portion of marina related facilities is similar to boat launch areas. For cost estimate purposes the on land development for 50 marina slips is equivalent to a boat launch area with one launch lane. A 100 slip marina has equivalent facilities as 2 launch lanes.)		
Interpretive Trails	1.0	L.F.
Hiking Trails	1.0	L.F.
Interpretive Trails for Handicapped	3.0	L.F.
Miscellaneous Parking Areas (for bank fishing, sightseeing, etc.)	6	S.Y.

TABLE 10-11
SUMMARY OF FACILITY COSTS FOR
FUTURE COST SHARED AREAS
AND EXISTING AREAS

COMPUTER ITEM NO.	FACILITY	FACILITY COST ¹
2	Access Road (20' Paved)	24/L.F.
3	Circulation Road (18' Paved)	20/L.F.
	Boat Launch Area	
703	1 Lane	53,000
	1 Lane without parking	72,000
704	2 Lane	163,000
	Camping Area	
705	10 Class A units	61,000
706	25 Class A units	226,000
707	50 Class A units	490,000
708	10 Class B units	78,000
709	25 Class B units	218,000
710	50 Class B units	465,000
713	20 Primitive units	63,000
714	Small Group Camping Area	32,000
715	Large Group Camping Area	67,000
	Picnic Area	
716	10 units (additional)	23,000
717	25 units	120,000
718	50 units	190,000
719	75 units	253,000
720	Minor Beach	104,000
721	Major Beach	520,000
722	Fishing Area	97,000
49	Hiking Trails	1.0/L.F.
48	Interpretive Trails	1.0/L.F.
42	Paved Interpretive Trails (for Handicapped)	3.0/L.F.
724	Visitor Center/Resource Manager's Office	1,200,000
292	Electric Distribution Line	4.50/L.F.
10	Miscellaneous Parking	6/S.Y.

¹All costs are rounded off to the nearest \$1000. For a break-down of these costs, see Tables 10-02 through 10-10.

TABLE 10-12

REHABILITATION COSTS OF RECREATION
FACILITIES AT JOHN H. KERR RESERVOIR

<u>FACILITY</u>	<u>UNIT</u>	<u>COST/UNIT*</u>
Rehabilitate Picnic Site	Each	\$ 455
Rehabilitate Picnic Shelter	Each	3,000
Rehabilitate Comfort Station	Each	25,000
Rehabilitate Campsite	Each	1,200
Rehabilitate Small Beach	Each	15,000
Rehabilitate Large Beach	Each	25,000
Rehabilitate Boat Launch	Lane	12,040
Rehabilitate Trails	Miles	5,280
Shoreline Protection	Ln. Yd.	80
Convert Picnic Site to Campsite	Site	1,200
Convert Campsite to Picnic Site	Site	455
Relocate Picnic Site**	Site	455
Relocate Class A Campsite	Site	1,700
Relocate Class B Campsite	Site	1,200
Relocate Boat Launch	Lane	11,180

*Costs provided by Wilmington District, Corps of Engineers.

**These costs represent the cost of relocating facilities into areas where support facilities are existing in the area. In areas where these facilities are not available, (Palmer Point, Ivy Hill, and Island Creek) costs will be increased to reflect the cost of the necessary support facilities.

TABLE 10-13
SUMMARY OF RELOCATED, REHABILITATED, AND CONVERTED FACILITIES
FOR COST ESTIMATES AT RECREATION AREAS

	Existing Recreation Areas															Total	Total Future Facilities	
	Palmer Point	Ivy Hill	Island Creek	Grassy Creek	Longwood	Buffalo Springs	Buffalo	Staunton View	Bluestone Landing	Rudds Creek	Eagle Point	Eastland Creek Landing	North Bend	Tall trace Access	Clarksville Overlook			
Campsites	Existing Campsites Relocate	45 -45	25 +50	0 0	11 -11	44 +25 ^Δ	0 0	15 -15	0 0	0 0	103 +25/ 15*	0 0	28 -28	245 0	0 0	0 0	516 115	
	Rehabilitate Convert to Picnic Site	0	25	0 0	0 10 ^Δ	44 0	0 0	0 0	0 0	0 0	88 15	0 0	0 0	245 0	0 0	0 0	402 25	
Picnic Units	Existing Picnic Units	20	13	9	21	10	6	17	8	6	15	0	5	67	0	0	197	
	Existing Shelters/Units Proposed New Units Relocate Rehabilitate	1/1 0 0 20	1/4 0 0 13	0 25 ^Δ 9* 0	1/3 0 0 21	1/3 10 ^Δ 0 10	0 0 0 6	0 25 ^Δ 0 17	0 0 0 0	0 0 -8 ^Δ 0	0 0 -6 0	0 0 15*** 0	0 0 0 0	0 0 0 5	3/22 0 +7 67	0 10 ^Δ 0 0	0 0 0 0	7/33 70 37 159
Boat Launch Lanes	Existing Launch Lanes Proposed New Lanes Relocate Rehabilitate Add Car-Trailer Parking (S. Yd.)	2 0 2* 0 0	2 0 0 2 0	2 0 0 2 0	2 0 0 1 0	2 1** 0 2 1665	0 0 0 0 0	2 0 0 2 0	2 0 0 0 0	2 ^Δ 0 0 0 2100	3 0 0 3 1665	2 0 0 2 0	2 0 0 2 0	5 0 0 0 0	1 0 0 1 1855	0 2 ^Δ 0 0 0	31 4 2 17	35
	Other Rehabilitation	0 0 0 1 0 0	1 0 0 0 3.1 100	0 0 0 0 0.5 0	1 1 0 0 0.5 0	1 1 0 0 1 150	0 0 0 0 0 0	0 0 0 0 0.5 100	0 0 0 0 0 0	0 0 0 0 0 0	0 3 0 0 1.5 0	0 0 0 0 0 0	0 1 1 0 1.5 100	1 8 1 1 2 500	0 0 0 0 0 0	0 0 0 0 0 500	4 14 4 2 10.6 1450	

Δ These facilities will be developed with a cost sharing sponsor.
* Relocate on site.
** Launch lane without parking.
*** No additional cost because these 15 sites were costed as converted to picnic sites.

□ One of the 8 picnic units from Staunton View will be relocated to Longwood as a campsite and costed as a relocated campsite.
○ These units will be in a picnic shelter and costed as one picnic shelter for six tables.

TABLE 10-14

FACILITY QUANTITIES - FUTURE COST SHARED AREAS

Site No.	PROPOSED SITES	Roads			Camping Areas										Picnic Areas				Other Areas				
		Access Road	Circulation Road	Boat Launch	10 Class A	25 Class A	50 Class A	10 Class A	25 Class B	50 Class B	Small Group	Large Group	10 Units	25 Units	50 Units	75 Units	Minor Beach	Major Beach	Fishing Area	L.F.	S.Y.	EA.	EA.
1.	South Dike	6,222																		10,560	677		
3.	Keats Peninsula	5,777																		2,640			
17.	Long Grass Point	17,777																					
19.	Walnut Hill	2,666																					
25.	Garretts Woods	14,222																					
27.	Turtle Head Peninsula	3,111																					
28.	Buchanan's Woods	3,333																					
30.	Soudan Landing	2,666																					
39.	Bluestone Park	2,666																					
35.	Viking Hills Park	2,666																					
44.	Oakleaf Point	16,000																					
45.	Butcher's Bayview	2,222																					
46.	Holly Grove	2,666																					
48Q.	Future Lease Site*																						
48.	Boydton Landing	7,111	1,600																				
50.	Newman Point	888																					
53.	Inglewood	1,777																					
*TOTAL AREAS		100,658	1,600	14	0	2	4	0	4	3	1	1	0	2	4	1	5	1	2	13,200	3,777	1	1

No development at Aaron's Access, Riverdale Access, Berry Hill Shores, Burrough Mill Landing, Piney Grove, Nutbush Woods, Sunrise Landing, Camper's Cove, Staunton River Ext, Town View, Duck Island, Beaver Woods, Mooresville Woods, and Soudan Village.

*This site is proposed for development by a quasi-public group. The nature of the development will be determined by the leasee.

TABLE 10-15
COST ESTIMATES
NORTH CAROLINA STATE RECREATION AREAS
SITE NO. 4 - KIMBALL POINT

COMPUTER ITEM NO.	ITEM	UNIT	UNIT COST	QTY.	COST
SITE PREPARATION AND LANDSCAPING:					
	Clearing and Grubbing	Ac.	2,000		
	Landscaping	Ac.	2,000	1	2,000
	Selective Clearing	Ac.	1,000	1	1,000
ROADS:					
3	Paved Roads - 18' Wide	L.F.	20	400	8,000
5	Service Roads - 10' Wide	L.F.	9		
PARKING:					
13	Paved Parking Lots	S.Y.	10	825	8,250
WATER RELATED FACILITIES:					
65	Boat Launch Ramp	L.F.	56		
63	Courtesy Docks	Ea.	15,000		
CAMPING FACILITIES:					
124	Class A Units with water and electric hookups	Ea.	1,700		
121	Class B Units without utility hookups	Ea.	1,200		
136	Group Camp Area Small*	Ea.	32,500	1	32,500
137	Group Camp Area Large*	Ea.	67,100	1	67,100
	Cabins	Ea.	15,000		
DAY-USE FACILITIES:					
180	Picnic Units	Ea.	455		
	Picnic Shelter - 8 tables	Ea.	12,000		
	Picnic Shelter - 12 tables	Ea.	15,000		
151	Playground	Ea.	6,000		
SIGNS:					
81	Entrance Signs	Ea.	3,300		
85	Information Signs	Ea.	50		

KIMBALL POINT (CONT'D)

COMPUTER ITEM NO.	ITEM	UNIT	UNIT COST	QTY.	COST
SANITARY STRUCTURES:					
226	Washhouse	Ea.	70,000		
227	Flush Toilet Restroom	Ea.	40,000		
211	Vault Toilet Restroom	Ea.	8,000		
	- Pair				
320	Sanitary Disposal	Ea.	20,000		
	Station				
321	Gravity Sewer Line	Ln.Ft.	10		
255	Septic System	Ea.	20,000		
WATER SYSTEM:					
231	Well with Hand Pump	Ea.	1,500		
232,	Well with Electric Pump/	Ea.	12,500		
233	Building and Storage Tank				
235	Water Distribution Line	Ln.Ft.	9.50		
	- 2"				
ELECTRIC SYSTEM:					
292	Electric Line	Ln.Ft.	4.50		
ADMINISTRATIVE AND MAINTENANCE:					
366	Ranger Security Building	Ea.	70,000		
361	Control Station	Ea.	8,700		
84	Gate or Barricade	Ea.	200		
TOTAL					Cost Shared
					\$118,850
**100% State					

*Includes facilities listed in Table 10-06.

TABLE 10-16

COST ESTIMATES
NORTH CAROLINA STATE RECREATION AREAS

SITE NO. 5 - COUNTY LINE PARK

COMPUTER ITEM NO.	ITEM	UNIT	UNIT COST	QTY.	COST
SITE PREPARATION AND LANDSCAPING:					
	Clearing and Grubbing	Ac.	2,000	6	12,000
	Landscaping	Ac.	2,000	4	8,000
	Selective Clearing	Ac.	1,000		
ROADS:					
3	Paved Roads - 18' Wide	L.F.	20	10,000	200,000
5	Service Roads - 10' Wide	L.F.	9		
PARKING:					
13	Paved Parking Lots	S.Y.	10	1,500	15,000
WATER RELATED FACILITIES:					
65	Boat Launch Ramp	L.F.	56		
63	Courtesy Docks	Ea.	15,000		
CAMPING FACILITIES:					
124	Class A Units with water and electric hookups	Ea.	1,700	50	85,000
121	Class B Units without utility hookups	Ea.	1,200		
136	Group Camp Area Small*	Ea.	32,500		
137	Group Camp Area Large*	Ea.	67,100		
	Cabins	Ea.	15,000	40	600,000**
DAY-USE FACILITIES:					
180	Picnic Units	Ea.	455		
	Picnic Shelter - 8 tables	Ea.	12,000		
	Picnic Shelter - 12 tables	Ea.	15,000		
151	Playground	Ea.	6,000		
SIGNS:					
81	Entrance Signs	Ea.	3,300		
85	Information Signs	Ea.	50	3	150

COUNTY LINE PARK (CONT'D)

COMPUTER ITEM NO.	ITEM	UNIT	UNIT COST	QTY.	COST
SANITARY STRUCTURES:					
226	Washhouse	Ea.	70,000	1	70,000
227	Flush Toilet Restroom	Ea.	40,000	1	40,000
211	Vault Toilet Restroom - Pair	Ea.	8,000		
320	Sanitary Disposal Station	Ea.	20,000	1	20,000
321	Gravity Sewer Line	Ln.Ft.	10	8,400	84,000
255	Septic System	Ea.	20,000	20	400,000
WATER SYSTEM:					
231	Well with Hand Pump	Ea.	1,500		
232,	Well with Electric Pump/	Ea.	12,500	1	12,500
233	Building and Storage Tank				
235	Water Distribution Line - 2"	Ln.Ft.	9.50	11,500	109,250
ELECTRIC SYSTEM:					
292	Electric Line	Ln.Ft.	4.50	11,500	51,750
ADMINISTRATIVE AND MAINTENANCE:					
366	Ranger Security Building	Ea.	70,000		
361	Control Station	Ea.	8,700	1	8,700
84	Gate or Barricade	Ea.	200	3	600
TOTAL					
Cost Shared					\$1,116,950
**100% State					600,000

*Includes facilities listed in Table 10-06.

TABLE 10-17
COST ESTIMATES
NORTH CAROLINA STATE RECREATION AREAS
SITE NO. 8 - BULLOCKSVILLE PARK

COMPUTER ITEM NO.	ITEM	UNIT	UNIT COST	QTY.	COST
SITE PREPARATION AND LANDSCAPING:					
	Clearing and Grubbing	Ac.	2,000	24	48,000
	Landscaping	Ac.	2,000	20	40,000
	Selective Clearing	Ac.	1,000		
ROADS:					
3	Paved Roads - 18' Wide	L.F.	20	13,000	260,000
5	Service Roads - 10' Wide	L.F.	9		
PARKING:					
13	Paved Parking Lots	S.Y.	10	3,500	35,000
WATER RELATED FACILITIES:					
65	Boat Launch Ramp	L.F.	56		
63	Courtesy Docks	Ea.	15,000		
CAMPING FACILITIES:					
124	Class A Units with water and electric hookups	Ea.	1,700	60	102,000
121	Class B Units without utility hookups	Ea.	1,200	40	48,000
136	Group Camp Area Small*	Ea.	32,500	3	97,500
137	Group Camp Area Large*	Ea.	67,100	1	67,100
	Cabins	Ea.	15,000	30	450,000**
DAY-USE FACILITIES:					
180	Picnic Units	Ea.	455	20	9,100
	Picnic Shelter - 8 tables	Ea.	12,000		
	Picnic Shelter - 12 tables	Ea.	15,000	3	45,000
151	Playground	Ea.	6,000		
SIGNS:					
81	Entrance Signs	Ea.	3,300		
85	Information Signs	Ea.	50	8	400

BULLOCKSVILLE PARK (CONT'D)

COMPUTER ITEM NO.	ITEM	UNIT	UNIT COST	QTY.	COST
SANITARY STRUCTURES:					
226	Washhouse	Ea.	70,000	3	210,000
227	Flush Toilet Restroom	Ea.	40,000	4	160,000
211	Vault Toilet Restroom - Pair	Ea.	8,000		
320	Sanitary Disposal Station	Ea.	20,000	3	60,000
321	Gravity Sewer Line	Ln.Ft.	10	2,000	20,000
255	Septic System	Ea.	20,000	10	200,000
WATER SYSTEM:					
231	Well with Hand Pump	Ea.	1,500		
232,	Well with Electric Pump/ Building and Storage Tank	Ea.	12,500	2	25,000
233					
235	Water Distribution Line - 2"	Ln.Ft.	9.50	2,000	19,000
ELECTRIC SYSTEM:					
292	Electric Line	Ln.Ft.	4.50	1,800	8,100
ADMINISTRATIVE AND MAINTENANCE:					
366	Ranger Security Building	Ea.	70,000	1	70,000
361	Control Station	Ea.	8,700		
84	Gate or Barricade	Ea.	200	5	1,000
TOTAL					
Cost Shared					\$1,525,200
**100% State					450,000

*Includes facilities listed in Table 10-06.

TABLE 10- 18

COST ESTIMATES
NORTH CAROLINA STATE RECREATION AREAS
SITE NO. 10 - SATTERWHITE POINT

COMPUTER ITEM NO.	ITEM	UNIT	UNIT COST	QTY.	COST
SITE PREPARATION AND LANDSCAPING:					
	Clearing and Grubbing	Ac.	2,000	6	12,000
	Landscaping	Ac.	2,000	4	8,000
	Selective Clearing	Ac.	1,000		
ROADS:					
3	Paved Roads - 18' Wide	L.F.	20	2,000	48,000
5	Service Roads - 10' Wide	L.F.	9		
PARKING:					
13	Paved Parking Lots	S.Y.	10		
WATER RELATED FACILITIES:					
65	Boat Launch Ramp	L.F.	56		
63	Courtesy Docks	Ea.	15,000		
CAMPING FACILITIES:					
124	Class A Units with water and electric hookups	Ea.	1,700	20	34,000
121	Class B Units without utility hookups	Ea.	1,200		
136	Group Camp Area Small*	Ea.	32,500		
137	Group Camp Area Large*	Ea.	67,100		
	Cabins	Ea.	15,000		
DAY-USE FACILITIES:					
180	Picnic Units	Ea.	455		
	Picnic Shelter - 8 tables	Ea.	12,000		
	Picnic Shelter - 12 tables	Ea.	15,000		
151	Playground	Ea.	6,000		
SIGNS:					
81	Entrance Signs	Ea.	3,300		
85	Information Signs	Ea.	50	1	50

SATTERWHITE POINT (CONT'D)

COMPUTER ITEM NO.	ITEM	UNIT	UNIT COST	QTY.	COST
SANITARY STRUCTURES:					
226	Washhouse	Ea.	70,000	1	70,000
227	Flush Toilet Restroom	Ea.	40,000	1	40,000
211	Vault Toilet Restroom	Ea.	8,000		
	- Pair				
320	Sanitary Disposal	Ea.	20,000	1	20,000
	Station				
321	Gravity Sewer Line	Ln.Ft.	10	400	4,000
255	Septic System	Ea.	20,000	1	20,000
WATER SYSTEM:					
231	Well with Hand Pump	Ea.	1,500		
232,	Well with Electric Pump/	Ea.	12,500		
233	Building and Storage Tank				
235	Water Distribution Line	Ln.Ft.	9.50	1,800	17,100
	- 2"				
ELECTRIC SYSTEM:					
292	Electric Line	Ln.Ft.	4.50	1,800	8,100
ADMINISTRATIVE AND MAINTENANCE:					
366	Ranger Security Building	Ea.	70,000		
361	Control Station	Ea.	8,700		
84	Gate or Barricade	Ea.	200		
TOTAL					Cost Shared
					\$281,200
**100% State					

*Includes facilities listed in Table 10-06.

TABLE 10-19
COST ESTIMATES
NORTH CAROLINA STATE RECREATION AREAS
SITE NO. 11 - NUTBUSH CREEK

COMPUTER ITEM NO.	ITEM	UNIT	UNIT COST	QTY.	COST
SITE PREPARATION AND LANDSCAPING:					
	Clearing and Grubbing	Ac.	2,000	3	6,000
	Landscaping	Ac.	2,000	3	6,000
	Selective Clearing	Ac.	1,000		
ROADS:					
3	Paved Roads - 18' Wide	L.F.	20	1,000	24,000
5	Service Roads - 10' Wide	L.F.	9		
PARKING:					
13	Paved Parking Lots	S.Y.	10	1,600	16,000
WATER RELATED FACILITIES:					
65	Boat Launch Ramp	L.F.	56	215	12,040
63	Courtesy Docks	Ea.	15,000		
CAMPING FACILITIES:					
124	Class A Units with water and electric hookups	Ea.	1,700		
121	Class B Units without utility hookups	Ea.	1,200		
136	Group Camp Area Small*	Ea.	32,500	1	32,500
137	Group Camp Area Large*	Ea.	67,100	1	67,100
	Cabins	Ea.	15,000		
DAY-USE FACILITIES:					
180	Picnic Units	Ea.	455		
	Picnic Shelter - 8 tables	Ea.	12,000		
	Picnic Shelter - 12 tables	Ea.	15,000		
151	Playground	Ea.	6,000		
SIGNS:					
81	Entrance Signs	Ea.	3,300		
85	Information Signs	Ea.	50	2	100

NUTBUSH CREEK (CONT'D)

COMPUTER ITEM NO.	ITEM	UNIT	UNIT COST	QTY.	COST
SANITARY STRUCTURES:					
226	Washhouse	Ea.	70,000		
227	Flush Toilet Restroom	Ea.	40,000		
211	Vault Toilet Restroom - Pair	Ea.	8,000	5	40,000
320	Sanitary Disposal Station	Ea.	20,000		
321	Gravity Sewer Line	Ln.Ft.	10		
255	Septic System	Ea.	20,000		
WATER SYSTEM:					
231	Well with Hand Pump	Ea.	1,500	2	3,000
232,	Well with Electric Pump/	Ea.	12,500		
233	Building and Storage Tank				
235	Water Distribution Line - 2"	Ln.Ft.	9.50		
ELECTRIC SYSTEM:					
292	Electric Line	Ln.Ft.	4.50	1,000	4,500
ADMINISTRATIVE AND MAINTENANCE:					
366	Ranger Security Building	Ea.	70,000		
361	Control Station	Ea.	8,700		
84	Gate or Barricade	Ea.	200		
TOTAL					Cost Shared \$211,240
**100% State					

*Includes facilities listed in Table 10-06.

TABLE 10-20

COST ESTIMATES
NORTH CAROLINA STATE RECREATION AREAS
SITE NO. 12 - WILLIAMSBORO WAYSIDE

COMPUTER ITEM NO.	ITEM	UNIT	UNIT COST	QTY.	COST
SITE PREPARATION AND LANDSCAPING:					
	Clearing and Grubbing	Ac.	2,000	2	4,000
	Landscaping	Ac.	2,000	1	2,000
	Selective Clearing	Ac.	1,000		
ROADS:					
3	Paved Roads - 18' Wide	L.F.	20	200	4,800
5	Service Roads - 10' Wide	L.F.	9		
PARKING:					
13	Paved Parking Lots	S.Y.	10	3,000	30,000
WATER RELATED FACILITIES:					
65	Boat Launch Ramp	L.F.	56	430	24,000
63	Courtesy Docks	Ea.	15,000	1	15,000
CAMPING FACILITIES:					
124	Class A Units with water and electric hookups	Ea.	1,700		
121	Class B Units without utility hookups	Ea.	1,200		
136	Group Camp Area Small*	Ea.	32,500		
137	Group Camp Area Large*	Ea.	67,100		
	Cabins	Ea.	15,000		
DAY-USE FACILITIES:					
180	Picnic Units	Ea.	455		
	Picnic Shelter - 8 tables	Ea.	12,000		
	Picnic Shelter - 12 tables	Ea.	15,000		
151	Playground	Ea.	6,000		
SIGNS:					
81	Entrance Signs	Ea.	3,300		
85	Information Signs	Ea.	50	1	50

WILLIAMSBORO WAYSIDE (CONT'D)

COMPUTER ITEM NO.	ITEM	UNIT	UNIT COST	QTY.	COST
SANITARY STRUCTURES:					
226	Washhouse	Ea.	70,000		
227	Flush Toilet Restroom	Ea.	40,000		
211	Vault Toilet Restroom	Ea.	8,000		
	- Pair			1	8,000
320	Sanitary Disposal Station	Ea.	20,000		
321	Gravity Sewer Line	Ln.Ft.	10		
255	Septic System	Ea.	20,000		
WATER SYSTEM:					
231	Well with Hand Pump	Ea.	1,500	1	1,500
232,	Well with Electric Pump/	Ea.	12,500		
233	Building and Storage Tank				
235	Water Distribution Line	Ln.Ft.	9.50		
	- 2"				
ELECTRIC SYSTEM:					
292	Electric Line	Ln.Ft.	4.50	800	3,600
ADMINISTRATIVE AND MAINTENANCE:					
366	Ranger Security Building	Ea.	70,000		
361	Control Station	Ea.	8,700		
84	Gate or Barricade	Ea.	200		
TOTAL					Cost Shared
					\$93,030
**100% State					

*Includes facilities listed in Table 10-06.

TABLE 10- 21
COST ESTIMATES
NORTH CAROLINA STATE RECREATION AREAS
SITE NO. 14 - TOWNSVILLE LANDING

COMPUTER ITEM NO.	ITEM	UNIT	UNIT COST	QTY.	COST
	SITE PREPARATION AND LANDSCAPING:				
	Clearing and Grubbing	Ac.	2,000	20	40,000
	Landscaping	Ac.	2,000	14	28,000
	Selective Clearing	Ac.	1,000		
	ROADS:				
3	Paved Roads - 18' Wide	L.F.	20	15,200	364,800
5	Service Roads - 10' Wide	L.F.	9		
	PARKING:				
13	Paved Parking Lots	S.Y.	10	3,000	30,000
	WATER RELATED FACILITIES:				
65	Boat Launch Ramp	L.F.	56		
63	Courtesy Docks	Ea.	15,000		
	CAMPING FACILITIES:				
124	Class A Units with water and electric hookups	Ea.	1,700		
121	Class B Units without utility hookups	Ea.	1,200	190	228,000
136	Group Camp Area Small*	Ea.	32,500		
137	Group Camp Area Large*	Ea.	67,100		
	Cabins	Ea.	15,000		
	DAY-USE FACILITIES:				
180	Picnic Units	Ea.	455	50	22,750
	Picnic Shelter - 8 tables	Ea.	12,000		
	Picnic Shelter - 12 tables	Ea.	15,000	2	30,000
151	Playground	Ea.	6,000	2	12,000
	SIGNS:				
81	Entrance Signs	Ea.	3,300	1	3,300
85	Information Signs	Ea.	50	2	100

TOWNSVILLE LANDING (CONT'D)

COMPUTER ITEM NO.	ITEM	UNIT	UNIT COST	QTY.	COST
SANITARY STRUCTURES:					
226	Washhouse	Ea.	70,000	2	140,000
227	Flush Toilet Restroom	Ea.	40,000	5	200,000
211	Vault Toilet Restroom - Pair	Ea.	8,000		
320	Sanitary Disposal Station	Ea.	20,000	1	20,000
321	Gravity Sewer Line	Ln.Ft.	10	1,400	14,000
255	Septic System	Ea.	20,000	4	80,000
WATER SYSTEM:					
231	Well with Hand Pump	Ea.	1,500		
232,	Well with Electric Pump/	Ea.	12,500	1	12,500
233	Building and Storage Tank				
235	Water Distribution Line - 2"	Ln.Ft.	9.50	15,000	142,500
ELECTRIC SYSTEM:					
292	Electric Line	Ln.Ft.	4.50	15,000	67,500
ADMINISTRATIVE AND MAINTENANCE:					
366	Ranger Security Building	Ea.	70,000		
361	Control Station	Ea.	8,700	1	8,700
84	Gate or Barricade	Ea.	200		
TOTAL					
Cost Shared					\$1,444,150
**100% State					

*Includes facilities listed in Table 10-06.

TABLE 10-22

COST ESTIMATES
NORTH CAROLINA STATE RECREATION AREAS
SITE NO. 15 - HIBERNIA RECREATION AREA

COMPUTER ITEM NO.	ITEM	UNIT	UNIT COST	QTY.	COST
	SITE PREPARATION AND LANDSCAPING:				
	Clearing and Grubbing	Ac.	2,000	20	40,000
	Landscaping	Ac.	2,000	15	30,000
	Selective Clearing	Ac.	1,000		
	ROADS:				
3	Paved Roads - 18' Wide	L.F.	20	8,000	192,000
5	Service Roads - 10' Wide	L.F.	9		
	PARKING:				
13	Paved Parking Lots	S.Y.	10	2,200	22,000
	WATER RELATED FACILITIES:				
65	Boat Launch Ramp	L.F.	56		
63	Courtesy Docks	Ea.	15,000		
	Marina	Ea.		1	125,000**
	CAMPING FACILITIES:				
124	Class A Units with water and electric hookups	Ea.	1,700		
121	Class B Units without utility hookups	Ea.	1,200		
136	Group Camp Area Small*	Ea.	32,500		
137	Group Camp Area Large*	Ea.	67,100		
	Cabins	Ea.	15,000	50	750,000**
	DAY-USE FACILITIES:				
180	Picnic Units	Ea.	455	15	6,825
	Picnic Shelter - 8 tables	Ea.	12,000		
	Picnic Shelter - 12 tables	Ea.	15,000		
151	Playground	Ea.	6,000		
	SIGNS:				
81	Entrance Signs	Ea.	3,300		
85	Information Signs	Ea.	50	3	150

HIBERNIA RECREATION AREA (CONT'D)

COMPUTER ITEM NO.	ITEM	UNIT	UNIT COST	QTY.	COST
SANITARY STRUCTURES:					
226	Washhouse	Ea.	70,000		
227	Flush Toilet Restroom	Ea.	40,000	2	80,000
211	Vault Toilet Restroom	Ea.	8,000		
	- Pair				
320	Sanitary Disposal	Ea.	20,000		
	Station				
321	Gravity Sewer Line	Ln.Ft.	10	8,400	84,000
255	Septic System	Ea.	20,000	20	400,000
WATER SYSTEM:					
231	Well with Hand Pump	Ea.	1,500		
232,	Well with Electric Pump/	Ea.	12,500	1	12,500
233	Building and Storage Tank				
235	Water Distribution Line	Ln.Ft.	9.50	8,000	76,000
	- 2"				
ELECTRIC SYSTEM:					
292	Electric Line	Ln.Ft.	4.50	8,000	36,000
ADMINISTRATIVE AND MAINTENANCE:					
366	Ranger Security Building	Ea.	70,000		
361	Control Station	Ea.	8,700	1	8,700
84	Gate or Barricade	Ea.	200		
TOTAL					Cost Shared \$988,175
			**100% State or concessionaire	750,000 125,000	marina cost
				<u>\$875,000</u>	

*Includes facilities listed in Table 10-06.

TABLE 10-23

COST ESTIMATES
NORTH CAROLINA STATE RECREATION AREAS

SITE NO. 16 - HENDERSON POINT

COMPUTER ITEM NO.	ITEM	UNIT	UNIT COST	QTY.	COST
SITE PREPARATION AND LANDSCAPING:					
	Clearing and Grubbing	Ac.	2,000	2.5	5,000
	Landscaping	Ac.	2,000	1.5	3,000
	Selective Clearing	Ac.	1,000		
ROADS:					
3	Paved Roads - 18' Wide	L.F.	20	900	21,600
5	Service Roads - 10' Wide	L.F.	9		
PARKING:					
13	Paved Parking Lots	S.Y.	10	1,000	10,000
WATER RELATED FACILITIES:					
65	Boat Launch Ramp	L.F.	56		
63	Courtesy Docks	Ea.	15,000		
CAMPING FACILITIES:					
124	Class A Units with water and electric hookups	Ea.	1,700		
121	Class B Units without utility hookups	Ea.	1,200		
136	Group Camp Area Small*	Ea.	32,500		
137	Group Camp Area Large*	Ea.	67,100		
	Cabins	Ea.	15,000		
DAY-USE FACILITIES:					
180	Picnic Units	Ea.	455	10	4,550
	Picnic Shelter - 8 tables	Ea.	12,000		
	Picnic Shelter - 12 tables	Ea.	15,000		
151	Playground	Ea.	6,000		
SIGNS:					
81	Entrance Signs	Ea.	3,300		
85	Information Signs	Ea.	50	2	100

HENDERSON POINT (CONT'D)

COMPUTER ITEM NO.	ITEM	UNIT	UNIT COST	QTY.	COST
SANITARY STRUCTURES:					
226	Washhouse	Ea.	70,000		
227	Flush Toilet Restroom	Ea.	40,000	2	80,000
211	Vault Toilet Restroom	Ea.	8,000		
	- Pair				
320	Sanitary Disposal	Ea.	20,000		
	Station				
321	Gravity Sewer Line	Ln.Ft.	10	400	4,000
255	Septic System	Ea.	20,000	2	40,000
WATER SYSTEM:					
231	Well with Hand Pump	Ea.	1,500		
232,	Well with Electric Pump/	Ea.	12,500	1	12,500
233	Building and Storage Tank				
235	Water Distribution Line	Ln.Ft.	9.50	1,000	9,500
	- 2"				
ELECTRIC SYSTEM:					
292	Electric Line	Ln.Ft.	4.50	2,000	9,000
ADMINISTRATIVE AND MAINTENANCE:					
366	Ranger Security Building	Ea.	70,000		
361	Control Station	Ea.	8,700		
84	Gate or Barricade	Ea.	200		
TOTAL					Cost Shared
					\$199,250
**100% State					

*Includes facilities listed in Table 10-06.

TABLE 10-24

COST ESTIMATES
REHABILITATION OF EXISTING FACILITIES
NORTH CAROLINA STATE RECREATION AREAS*

SITE NO.	SITE NAME	Campsites	Comfort Stations	Picnic Shelters	Picnic Units	Beach	Boat Launch	Marina	Shoreline (yards)
4	Kimball Point	98	5	1	8	1	1	-	3,000
5	County Line Park	85	5	1	10	-	2	-	6,500
8	Bullocksville Park	69	7	2	42	-	1	-	5,000
10	Satterwhite Point	159	7	5	22	-	5	1	4,300
11	Nutbush Creek	108	5	1	6	-	1	-	2,400
12	Williamsboro Wayside	-	-	-	-	-	-	-	-
14	Townsville Landing	-	-	-	-	-	2	-	3,800
15	Hibernia	150	6	1	93	-	4	-	4,000
16	Henderson Point	84	3	1	24	-	3	-	4,320
TOTAL		753	38	12	205	1	19	1	33,320

*This rehabilitation program includes almost all the facilities at the North Carolina State Recreation Areas including several proposed in this plan for elimination. It is felt that major facility eliminations and new developments are not likely to be accomplished in the near future. The existing facilities need rehabilitation to allow them to function until the time that the major redevelopment schemes are realized.

TABLE 10-25
COST ESTIMATES
VIRGINIA STATE PARK AREAS

OCCONEECHEE STATE PARK

Item	Unit	Unit Cost	Quantity	Cost
20 Primitive Camp Units	Area	63,000	3	189,000
Hiking Trail	L.F.	1.0	2000	<u>2,000</u>
Total Cost				\$191,000

The Commonwealth of Virginia has not developed future plans for their state parks. Goals for future development are presented earlier in the Master Plan text. The proposed development summarized here and shown on the site plan illustrates the concept for future use of the Panhandle Peninsula as a "Wilderness Unit" of the state park.

TABLE 10-26
INTER-SITE HIKING TRAILS

<u>Trail Location</u>	<u>Lineal Feet</u>	<u>Cost/ Lineal Feet</u>	<u>Cost</u>
Longwood to Turtle Head Peninsula	36,000	1.0	\$36,000
Occoneechee State Park	36,000	1.0	36,000
North Bend to Newman Point	43,800	1.0	43,800
Hibernia to Townsville Landing	19,000	1.0	<u>19,000</u>
Total			\$134,800

PART 5

SPECIAL PROBLEMS

CHAPTER 11

SPECIAL PROBLEMS

CHAPTER 11

SPECIAL PROBLEMS

11-01 INTRODUCTION

John H. Kerr Reservoir has certain problems which are particular to the project and deserve special consideration. These problems have impacted the use and enjoyment of the reservoir in the past or have the potential to do so in the future. While some of these problems have been discussed previously in this Master Plan Update, their importance and potential impact warrants more expansive discussions. Other problems have not been introduced previously in this Master Plan Update but must be recognized and discussed. Topics discussed in the following sections include marinas, erosion and siltation, water level fluctuations, and reservoir access.

11-02 MARINAS

The recreation use analysis presented in Chapter 4 established a strong demand for boating facilities at John H. Kerr Reservoir. Existing marina operations at the reservoir offer limited services and facilities that do not meet this demand.

There are five marinas in operation at Kerr Reservoir. Two of these, Flemington Road Marina (Meekins Marina) and Townsville Landing Marina are marginal operations with quite limited facilities. The marina at North Bend Park is small and has limited facilities, depending heavily on the camping area associated with it for revenue. Satterwhite Point Marina (Tar Heel Marina) contains good on-land facilities for the service and storage of boats but provides quite limited docking and mooring facilities on the water. The most sophisticated marina facility at John H. Kerr is Clarksville Marina which provides a full range of land based and water based facilities and services. Clarksville Marina benefits from its location in an urban area but is limited by the small physical size of the leasehold. The potential for the existing marina to expand to meet the demand for facilities is poor.

The North Bend Park Marina needs extensive development of docking and mooring facilities as well as on-land infrastructure. It is doubtful that the present operator will be willing to make this investment. The operator of Clarksville Marina has made and will continue to make investments in facilities. He is limited by the size and configuration of his lease, most severely by limited space to provide parking. By keeping the launch ramp and parking area open to the public, the marina

is not able to provide adequate parking for its customers. It is recommended that the launch ramp at Clarksville Marina be closed to the public and that a two lane launch be built at Clarksville Overlook to replace it.

To better meet the strong demand for marina facilities, major new development is needed at Kerr Reservoir. The Master Plan Update identified three sites that are highly suitable for a future marina development. The Keats Peninsula site has a large protected water area and a large land base for associated development. It is located about two miles from the dam at the mouth of the heavily visited Nutbush Creek arm of the reservoir. The Lynchburg Y.M.C.A. site is now leased as a quasi-public use area but it is not anticipated that the lease will be renewed. This site is located on Butcher's Creek, proximate to U.S. Highway 58. Present use of the site has necessitated the provision of utilities and other infrastructure. This would significantly reduce the initial costs associated with a future marina development. The third suitable location is a peninsula located at the confluence of Butcher's Creek and Rudd's Creek. In addition to its good location adjacent to Highway 58, this site has the advantage of a private inholding out on the peninsula. Acquisition of this inholding would allow a potential developer unlimited flexibility in the nature of his development.

It is recommended that the continued development of Clarksville Marina and North Bend Park should be encouraged. Also that a developer for any one of the three identified potential sites be actively pursued. The State of North Carolina along with the Corps of Engineers should review its sublease policy with marina operators with the objective of encouraging continued investment in the existing marina operations in the State.

11-03 EROSION AND SILTATION

John H. Kerr Reservoir, as all bodies of water, is subject to shoreline erosion. Throughout the course of the Master Plan Update process, observations have been made of shoreline areas experiencing significant erosion problems. Both field observation and the aerial photographic interpretation associated with the vegetation analysis have identified these areas. Areas showing significant erosion are mapped with the Slope Analysis (Plates 2-02 and 2-03) and are shown on the site analyses for existing and proposed recreation areas. Photo 11-01 shows an area of shoreline erosion on John H. Kerr Reservoir.

Shoreline erosion impacts the operation and use of the project in several ways including: access to the shoreline, aesthetics,



PHOTOGRAPH 11-01
SHORELINE EROSION; JOHN H. KERR RESERVOIR

reservoir siltation, and encroachment on private property. In 1976 a COE study of the latter problem was undertaken to evaluate alternative solutions on nine sites. In all nine cases it was discovered that the least cost alternative was fee acquisition of the property subject to encroachment.

Although it is not economically feasible to implement an extensive shoreline erosion control program, the Corps is interested in retarding erosion whenever possible. The Resource Management staff at Kerr is available to advise adjoining landowners on possible means of retarding erosion in front of their homes and cottages. Other public agencies such as the Soil Conservation Service and U.S. Department of Agriculture have been contacted to determine the availability of publications on this subject. A list of these publications will be made available from the Resource Manager's office. Permits for the explicit purpose of controlling shoreline erosion will be issued on a cost-free basis. Normally, permits for this purpose will be issued only in shoreline segments zoned as Limited Development Areas. There may be areas outside of this category, however, where an adjoining landowner or other individual would like to perform erosion control work. These requests will be handled on an individual basis.

During the construction of the John H. Kerr project, a system of 114 sedimentation ranges was established. These ranges were resurveyed in 1976. The loss in storage due to reservoir sedimentation during the 24 years that the project has been in operation is 38,465 acre feet or 0.28 acre feet per square mile per year. At this rate of sedimentation the usable storage area in the reservoir will not be significantly depleted for hundreds of years.

Due to the extent of shoreline erosion at the reservoir it is recommended that a study of the problem be undertaken. The study should examine the extent of the problem and prioritize areas for shoreline stabilization. Some techniques of shoreline stabilization are discussed in Section 8-22(L) of this report.

11-04 RESERVOIR FLUCTUATIONS

The primary project purpose for John H. Kerr Reservoir is flood control. Operation of the project for this purpose necessitates raising the water level for storage when river flows are high and lowering levels to provide storage capacity when flows are low. These fluctuations have profound implications for recreation, wildlife, vegetation, shoreline erosion, and aesthetics on the project. Photo 11-02 shows a recreation area which is flooded by high water levels.



PHOTOGRAPH 11-02
EFFECT OF HIGH WATER ON RECREATION FACILITIES;
JOHN H. KERR RESERVOIR

In 1973, in response to frequent low water levels in the reservoir, the rule curve for reservoir regulation was raised. The new rule curve dictates maintaining water levels from August through February that are higher than under the old curve. Water levels from March through July would be the same as before the change in the rule curve. Since 1973 frequent high water events have been taking place on the reservoir.

In the summer of 1979 the Wilmington District Hydraulics Branch undertook a study of reservoir levels as related to the change in the rule curve (memo of July 12, 1979). This analysis found that "low lake levels, below 293 feet m.s.l., have been virtually averted while most major flood peak levels have not been altered." The study suggests that high water levels are more likely caused by increased precipitation than by the change in rule curve.

It is recommended that a comprehensive study of reservoir regulation and reservoir water levels be undertaken to serve as a guide for future reservoir regulation. The study should include, but not be limited to, the following:

1. Actual and hypothetical water levels under the old rule curve, projected forward to present.
2. Actual and hypothetical water levels under the new rule curve, projected backward to 1960.
3. Rate and extent of shoreline erosion 1960 to present.
4. Environmental and economic impacts of high water levels on vegetation and recreation.
5. Economic impact of new rule curve on power production.
6. Impacts of alternative regulation curves on all authorized project purposes.

11-04 RESERVOIR ACCESS

Several access problems exist at John H. Kerr Reservoir. There are several tracts of project land which suffer from inadequate access, including seven potential recreation areas. The Kerr Reservoir Resource Manager has identified at least 76 parcels which suffer from access problems; 7 of these are within proposed recreation areas. Parcels experiencing access problems are identified on Plates 3-05 and 3-06, the Cultural Influences Map.

Access is needed to all project lands to assure the efficient management of the area for project purposes and for public safety.

Access to all areas is needed,

1. to assure public use of project lands,
2. to maintain the boundary of the project,
3. for forest management, and
4. for forest fire control.

Because of the frequency of access problems, it is recommended that a study be conducted for the identification, analysis and resolution of access problems. The study should also address the issue of the public's access to the lakeshore where private facilities such as boat docks have been permitted.

EXHIBIT A
FACILITY DESIGN CRITERIA

A-01 INTRODUCTION

The design of all proposed recreation areas at John H. Kerr Reservoir will be in accordance with current standards as outlined in the following documents: ER 1110-2-400, "Design of Recreation Sites, Areas, and Facilities"; EM 1110-2-400, "Recreation Facilities Planning and Criteria"; and ER 1165-2-400, "Recreation Planning, Development, and Management Policies"; EM 1110-1-103, "Design for the Physically Handicapped"; CERL Technical Report D-63 "Design Guidelines for Recreational Roads"; "Criteria for Design of Recreation Roads, Civil Works Projects, SADEN-TC. In addition, Virginia and North Carolina state public health and sanitation requirements, and state building codes must be followed in the detailed design and construction phases of the project.

The design criteria presented in this exhibit relate primarily to site preparation, roads and parking, boating facilities, swimming beaches, camping areas, day use areas, trails, signs, sanitary facilities, electrical facilities, water supply facilities, and recreation area structures. Construction of proposed facilities recommended in this Master Plan Update will require the preparation of a detailed Feature Design Memorandum for each site. However, the information contained herein records the criteria that were applied during the preparation of the Master Plan.

A-02 SITING

A. General. As discussed in Chapters 2, 3, and 7 of the Master Plan and shown on the Site Analysis, Net Usable Recreation Lands and Natural Resource Composite Maps, there are a number of site characteristics that limit or influence the development of recreational facilities at John H. Kerr Reservoir. The major considerations which dictated the locations of all proposed recreation facilities were mapped on the Net Usable Recreation Lands map and include topography, area size and configuration, soils, relation of areas to the reservoir and access potential.

Only the most adaptable topography will be used for the siting of facilities. Forced siting will be avoided unless the efficient use of the area requires modification of existing landforms. Major cuts and fills will be used only when a satisfactory alternative site is unavailable, and then only for the siting of a specific facility. Existing clearings will be used whenever possible and where clearing is necessary, selective clearing will be practiced. Similarly, existing disturbed areas and existing roads or road beds will be utilized whenever possible.

Another factor to consider when siting facilities is topographic aspect. Siting facilities with the proper relation to aspect will increase user comfort, increase energy efficiency and reduce impacts to the site. Figure A-01 illustrates the ideal aspect for locating various types of recreational development.

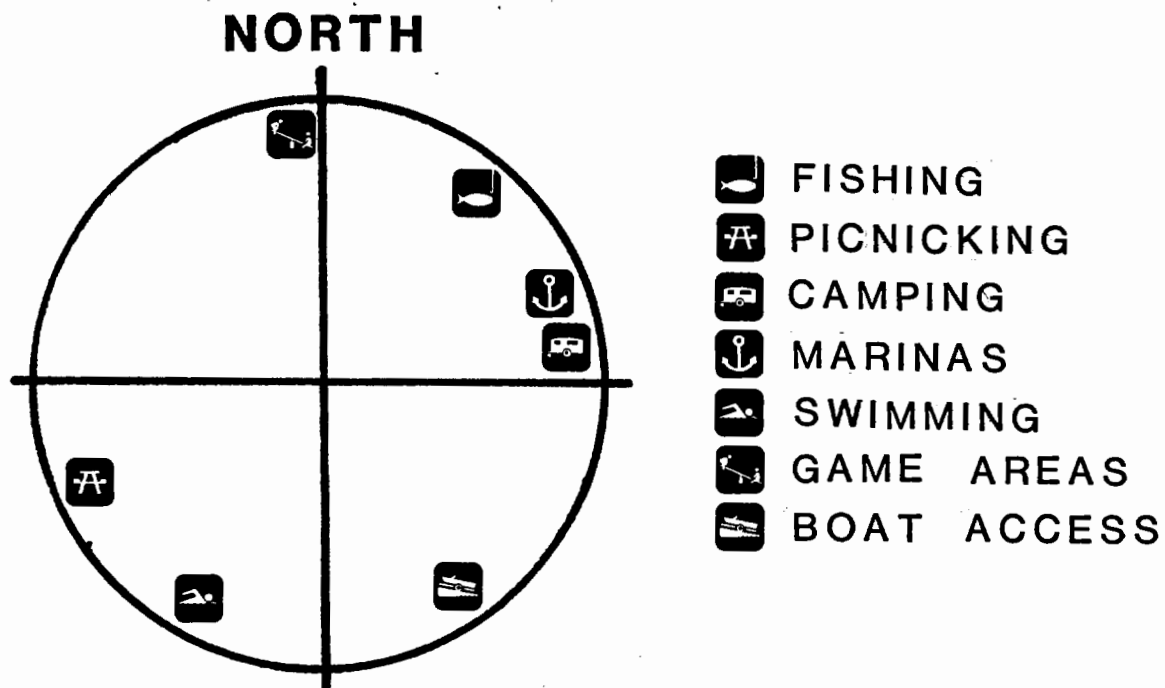


FIGURE A-01
RELATIONSHIP OF TOPOGRAPHIC ASPECT TO
THE LOCATION OF RECREATION DEVELOPMENT

Final design and construction supervision will play a key role in the successful implementation of the proposals presented in the Master Plan Update. The general location of facilities are shown on the orthophoto site plans in a bubble form to allow the project designers flexibility in the design of recreational facilities and road alignments during more detailed design and construction phases.

B. Elevation Considerations.

1. The boat launching ramps will be constructed to extend at least to elevation 290 feet m.s.l. to accommodate launching and removal of boats during dry seasons. Basins for marinas and boat

service facilities will be constructed to at least elevation 282 feet m.s.l.

2. Habitable buildings, washhouses and comfort stations, septic systems and water systems (except "closed systems"), and other structures subject to substantial damage from inundations, will be sited at levels above the flood control pool level of 320 feet m.s.l. Circulation roads, parking, picnic sites and campsites may extend to the five year flood pool elevation of 310 feet m.s.l.

A-03 SITE PREPARATION AND LANDSCAPING

A. General. Site preparation (including excavation, clearing, grubbing, and landscape planting) for the various buildings, camping areas and day-use areas will vary according to individual site conditions such as slope, vegetation, surrounding land use, bedrock geology and soil characteristics. All grading and earthwork will be done in accordance with established erosion control measures and shall meet all state and local ordinances. During all site construction operations, particular emphasis will be placed on the protection of vegetation and other site factors.

B. Landscape Planting. Most recreation sites have an abundance of existing trees and other vegetation. A primary consideration is the retention of as much natural vegetation as possible. However, unavoidable minimal disturbance will necessitate additional landscaping. Landscape planting throughout the project will be used to screen, buffer, and blend constructed facilities into the existing environment, and to control erosion. Existing and proposed entrance areas and structures will be enhanced by the use of landscape planting. Mass plantings will be necessary in some areas to create the desired environment and shade for picnicking and camping. Trees and ground covers will be the primary landscape elements utilized. However, shrubs will be utilized where screening on a smaller scale is needed. Plantings will be both deciduous and evergreen to provide year-round interest and a range of colors and textures. Native shrubs and trees will be used for landscape plant materials with the intent of having all plant material indigenous, maintenance free and functional. In the cost estimates portion of this plan, landscape planting consists of labor and materials necessary to plant trees, shrubs, ground cover, and grasses throughout a particular site.

A-04 ROADS

A. General Criteria. The road system within the project boundary will play a significant role in providing a quality recreational experience for the visiting public. The following guidelines

will be considered in locating and designing proposed access and circulation roads.

1. Alignment. Curvilinear alignment is preferred over long tangents. Roads will be designed to compliment the existing terrain and to optimize scenic views. In addition, consideration will be given to the creation and maintenance of irregular right-of-way borders to enhance the visual characteristics of the roadway.

2. Profile. Deep cuts and high fills are to be avoided to reduce environmental impacts. When suitable borrow material is available, consideration should be given to building the roadbed slightly above the natural ground level. Positive effects of this method of road construction relate to improved drainage, minimal environmental disturbance, reduced cost, and control of vehicular traffic in undesignated areas.

3. Drainage. Swales and interceptor ditches will be constructed as necessary. The use of culverts will be kept to a minimum. One-way circulation roads will be cross-sloped where possible to minimize ditching.

4. Materials. All access and circulation roads will be paved. The thickness of these sections will be based on soil studies conducted during the final Feature Design Memorandum Stage. Service roads may have a gravel surface. The cost estimates for roads include materials, labor, and grading.

B. Design Standards and Typical Road Sections. Table A-01 includes the major design standards associated with the various types of roads that will serve the proposed recreation and operations areas within the project boundaries. A typical section of each road type is shown on Figures A-02 through A-05.

A-05 PARKING

A. General. Parking facilities will be provided as an integral part of the circulation system for John H. Kerr Reservoir. The parking facilities shall be sited so that their physical impact on the natural environment is minimized. Various landscaping techniques will be utilized to screen parking areas from recreational facility areas. The visual character of all parking areas will be enhanced by providing planting islands and/or landscape aisles wherever possible. All proposed parking lots will be physically separated from major access roads to minimize circulation conflicts.

B. Design Criteria.

1. Facility Parking Requirements. The number of parking

TABLE A-01
ROADWAY DESIGN STANDARDS
FOR JOHN H. KERR RESERVOIR*

Road Type	Road Width (ft.)	Shoulder Width (ft.)	Maximum Gradient (%)	Design Speed (mph)	Minimum Radius (ft.)
Major Access	20	4	8	40	510
Two-Way Circulation	18	3	9	30	275
One-Way Circulation	12	2	10	20	115
Service	10	2	11	10	50

*CERL Technical Report D-63 "Design Guidelines for Recreational Roads"

spaces to be provided at various use areas are generally based on the following criteria:

- a. Class A and B campsites (one 12' x 70' spur/unit).
- b. Primitive Camp Unit - One car space/unit and one boat mooring post/unit.
- c. Picnic Unit - One car space/unit.
- d. Boat Launch Ramp - 25 car/trailer spaces/lane.
- e. Day-Use Areas (Picnic Areas, Beaches, etc.) - One car space/4 visitors.
- f. Marina - .75 space/slip.

2. Materials. All pertinent parking areas will be paved and overflow parking areas will have a graveled surface. Design of parking areas and thickness of sections will be determined during the Design Memorandum Stage. The cost estimate of parking areas includes paving materials for parking spaces and aisles, labor, site preparation, and grading.

3. Size. Car-trailer spaces will be 10' by 40' and car parking spaces will be 10' x 20'. Approximately 2% of the total

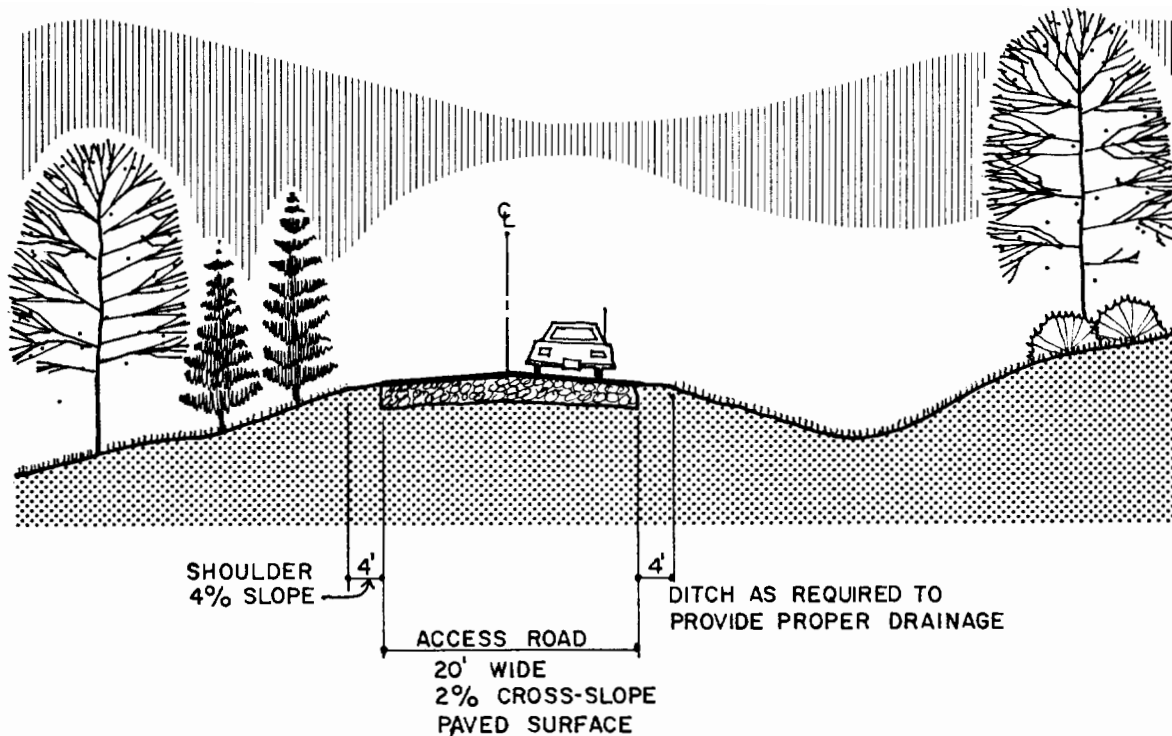


FIGURE A-02
TYPICAL MAJOR ACCESS ROAD

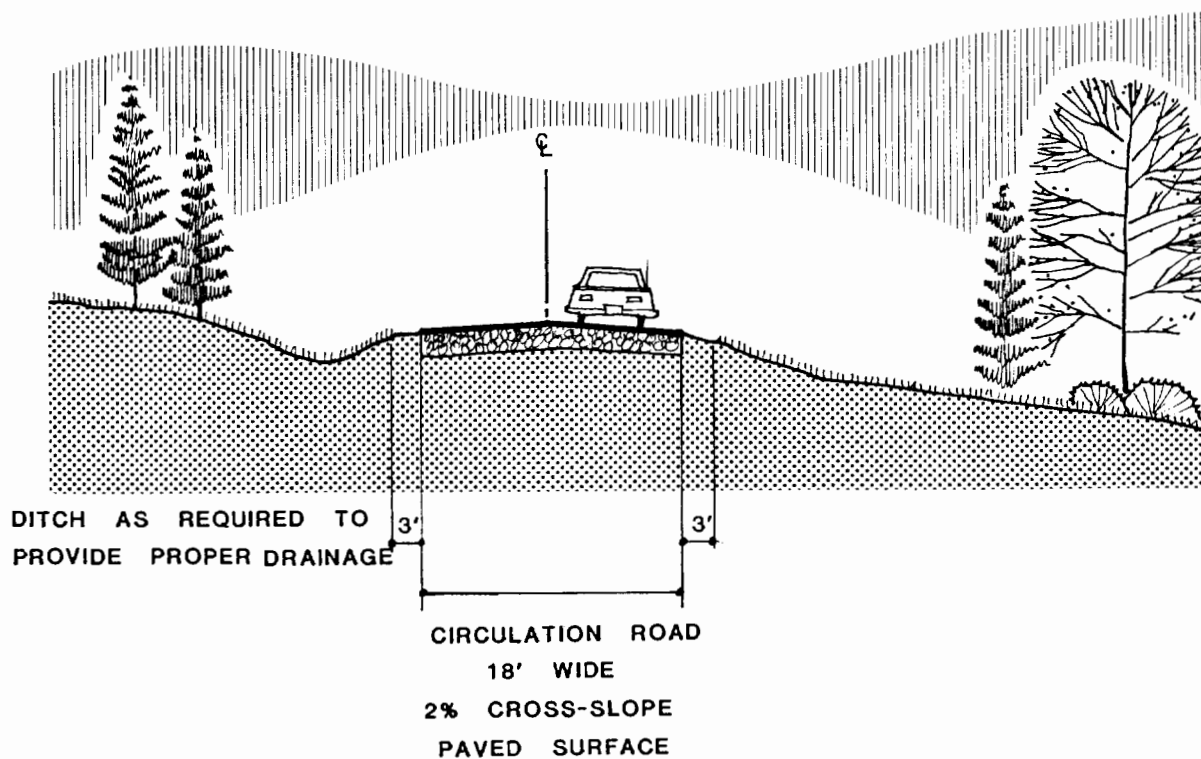


FIGURE A-03
TYPICAL TWO-WAY CIRCULATION ROAD

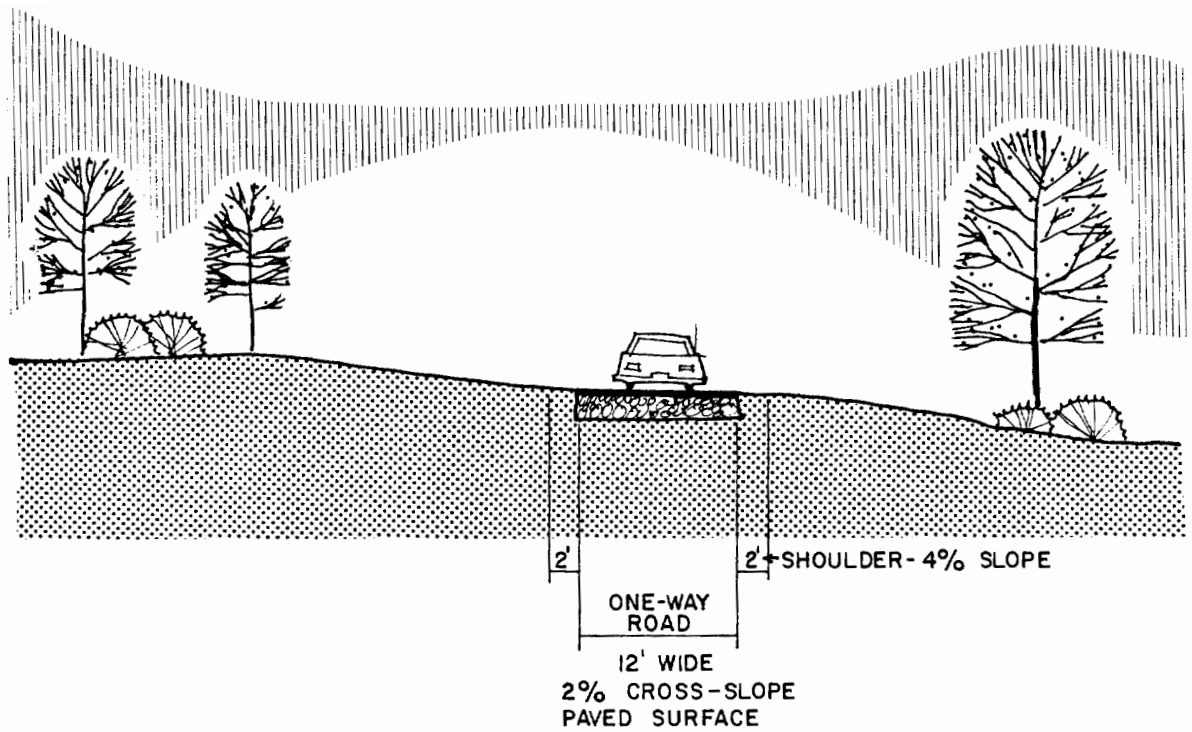


FIGURE A-04
TYPICAL ONE-WAY CIRCULATION ROAD

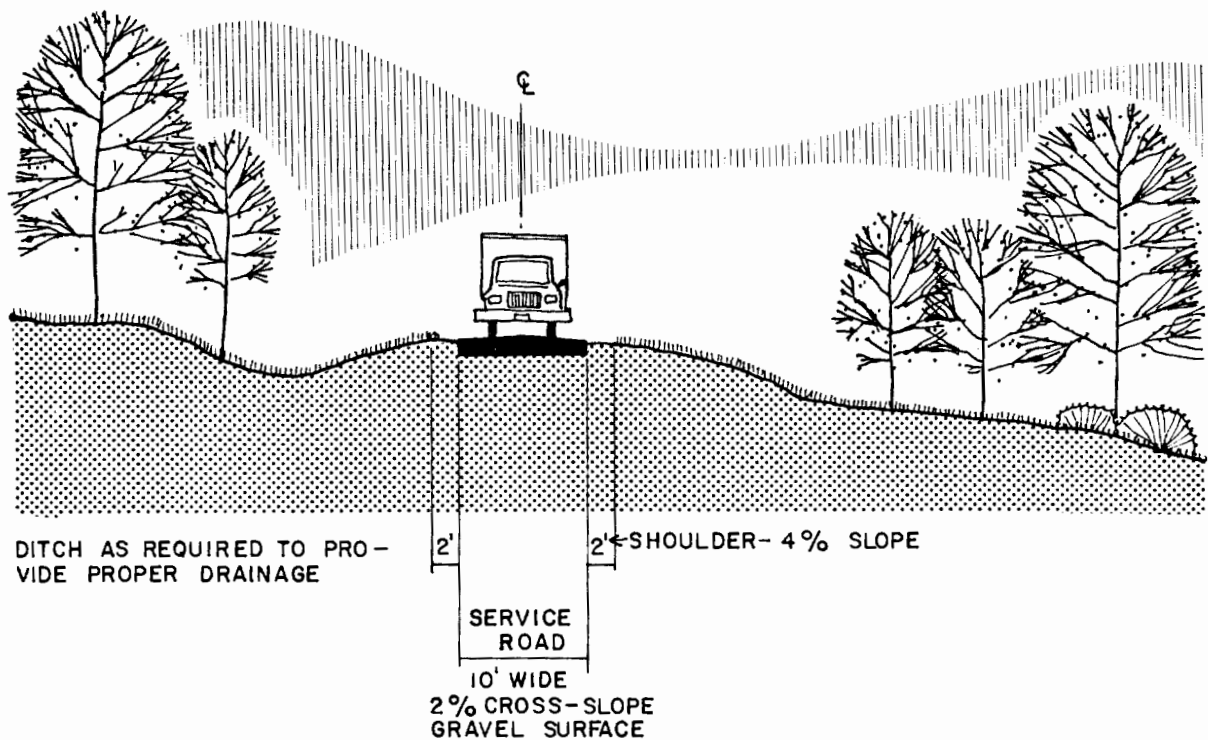


FIGURE A-05
TYPICAL SERVICE ROAD

number of spaces in each use area will be specifically designed and reserved for the use of handicapped persons. These spaces will be 14' wide or 4' wider than normal spaces to allow for a 4' walkway. These will be conveniently located to walkways, buildings, site impact areas, etc.

4. Layout. Parking lots should be designed to allow for efficient movement of vehicles through the lot. Parking areas may be in separate lots off of the circulation or access road or may have spaces which are at 90 degrees to a circulation road. Lots for cars with trailers will provide pull through spaces where possible or pull in and back out spaces in areas where space is limited by slopes, vegetation or other constraints. Car with trailer spaces will be at 45 degrees to the aisle when possible.

5. Other Features. All parking spaces, except pull-throughs will be provided with wheel stops. Curbing and catch basins will be minimized; storm run-off will be surface drained whenever possible.

6. Typicals. Figure A-06 illustrates a typical parking lot meeting the general design criteria described above.

A-06 BOAT LAUNCH LANES

A. General Guidelines. The following guidelines must be considered in the design of efficient boat launch lanes:

1. Locate final access road so that the approaching traffic does not interfere with launching operation.

2. Provide vehicular access to the parking area without driving through the actual launching area.

3. Locate courtesy docks separately from the launching lanes to prevent delay in loading and unloading.

B. Design Standards. Boat ramp lanes will be 12' wide, and where multiple lanes occur, they should be divided into groups of 2 lanes each, with a minimum of a 4' space between each pair of lanes. Also, a 6" curb will be placed along the edge of each pair of lanes. Boat launch lanes at John H. Kerr will extend from elevation 310 feet m.s.l. to elevation 290 feet m.s.l., at a grade of 13 to 15 percent.

Launch lanes will have a scored concrete or rough surface and ramp shoulders will be stabilized with rip-rap where necessary to prevent erosion caused by wave action. Minimum supporting facilities will include 1 courtesy dock, 1 trash receptacle, and appropriate

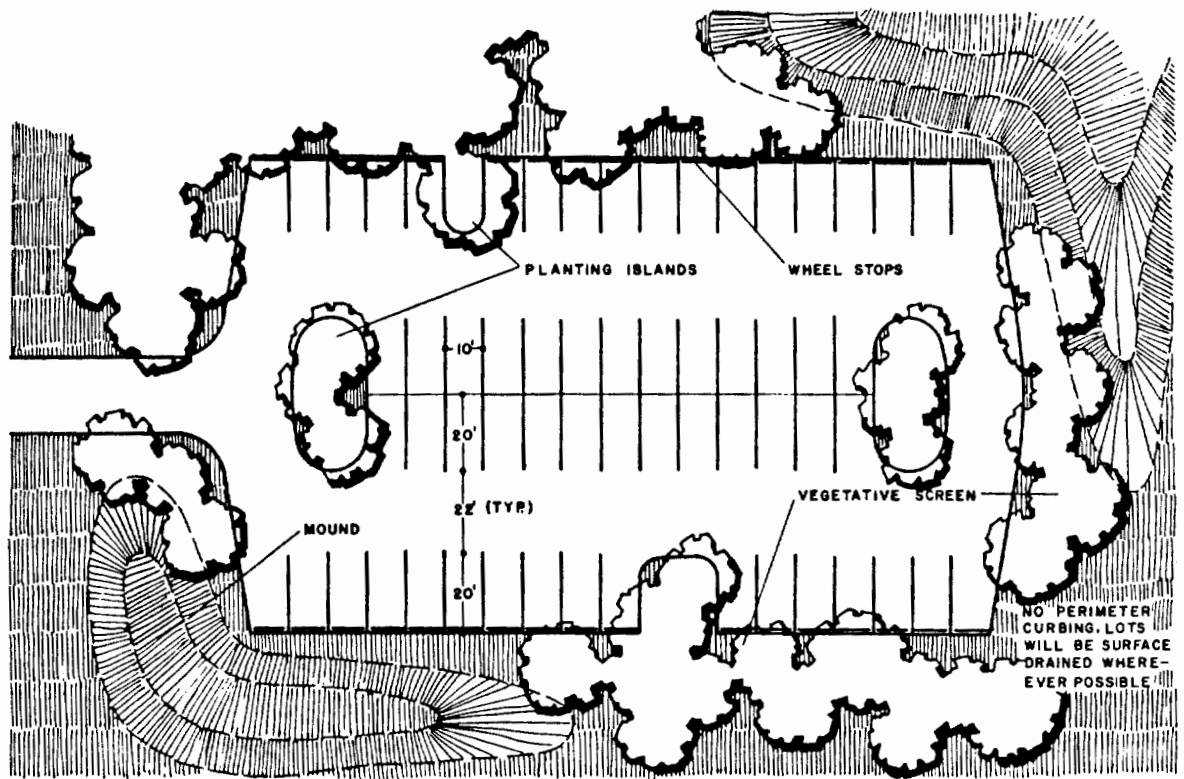


FIGURE A-06
TYPICAL CAR PARKING LOT*

*This drawing depicts the dimensions, layout, and possible landscape treatment of a car parking lot. The final design of parking lots will vary.

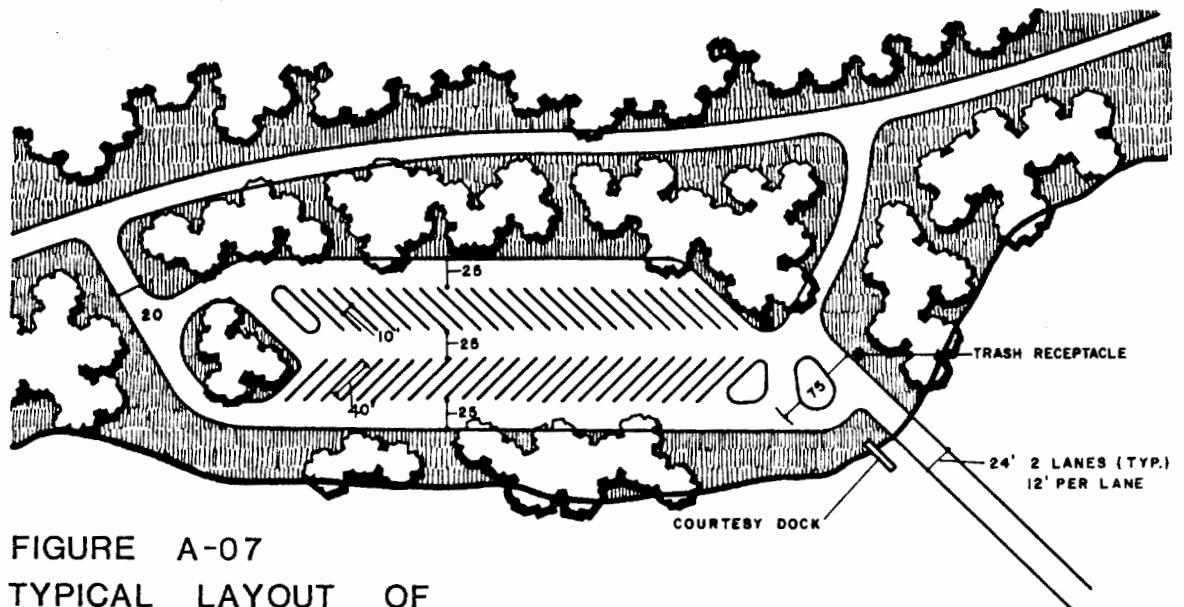


FIGURE A-07
TYPICAL LAYOUT OF
BOAT LAUNCH AND PARKING*

*Showing the circulation, layout and dimensions of a boat launch and parking area. The final design of boat launch areas will vary due to slope limitation and space requirements.

security lighting. Costs for launch lanes include paving of ramp, turnaround and parking areas, lighting, grading, trash receptacles, and signage. Existing ramps which are not designed to these standards or are in need of repair will be rehabilitated to these criteria.

C. Typicals. Typical layout of boat launching lanes and parking are shown on Figure A-07.

8-07 DOCKS AND MARINA FACILITIES

A. Marina Facilities. Marina facilities should be provided as necessary to meet the needs of the public. The construction, maintenance and operation of all marina facilities will be in strict compliance with appropriate Corps of Engineers policies and regulations.

In order to provide for optimum management and operation of a marina facility at John H. Kerr Reservoir the following criteria should be considered.

1. Marina basins should be located, constructed, and maintained at a water depth sufficient to facilitate the safe use of the marina year-round and during dry seasons. Therefore the marina basin should be at least as deep as elevation 282 feet m.s.l.

2. A northeast exposure to the reservoir is preferred since prevailing winds come from the southwest in the project area. All marina locations should be investigated for wave action based upon the recorded maximum wind velocity. An average wave height less than one foot and a maximum wave height of 1.5 feet are considered safe operating limits of marinas.

3. The area must provide suitable land area for parking to accommodate the number of marina users anticipated.

4. Marinas should be located near other major use areas to help assure the financial feasibility of the facility.

5. Covered slips will be provided to meet the demand of boaters (if recommended in a Marina Market Analysis).

6. Electric and water utilities will be provided for use on the docks.

7. A marine dumping station should be provided at the marinas for collecting wastes from boat holding tanks.

8. A concession building and fuel pumping station will be provided on the docks for convenient use by boaters.

B. Courtesy Dock. Ideally, a minimum of one courtesy dock will be provided at each boat launching ramp to facilitate safe and convenient boat launching and retrieval. For cost estimating it is assumed the a courtesy dock is provided. Each courtesy dock will accommodate a minimum of two boats at one time. Design of docks will be determined by Feature Design Memorandum. Basic criteria to be used for the design of courtesy docks include:

1. Live loads. 50 psf uniform live load on dock and bridge, or 400-pound concentrated load applied over an area of 12" x 12".

2. Wind load. Uniform load of 17 psf (80 mph) on all projected surfaces assuming 100 percent boat occupancy.

3. Wave and current loadings. Will be considered on a site by site basis.

4. Freeboard. Dead load freeboard of all floating dock units shall be 18" - 24". Freeboard under dead load and 30 psf live load shall not be less than 10".

5. Elevations. All docks shall be functional from an upper elevation of 308 feet m.s.l. to a lower elevation of 296.0 feet m.s.l.

C. Fishing Dock. Fishing Docks will be provided in areas proposed for bank fishing. The docks will be designed to allow use by the handicapped, and will be equipped with appropriate safety devices. Fishing docks will be the same as courtesy docks, with the addition of railings on the platform. Fishing docks will be designed to accommodate pool fluctuations from 296.0 - 308 feet m.s.l. with a minimum amount of maintenance.

A-08 CAMPING AREAS

A. General. Camping areas should be designed to blend with the natural landscape. Therefore, deep cuts and fills will be avoided; and individual sites will be located in the field giving particular emphasis to individual site characteristics such as terrain, vegetation, and views. All campsites should be located as close to the lakeshore as possible. However, all campsites must be located at or above the 5-year flood level of 310 feet m.s.l. in order to minimize flood damage to facilities.

Spurs should be designed to limit the use of vehicles to the paved area only. This can be accomplished with a curb around the spur using logs or railroad ties or it may be accomplished through grading, providing ditches or slopes at the edge of spurs.

B. Trash Collection. Centralized trash collection facilities may be provided to minimize operational expenses. A centralized trash collection facility will be located within 600 feet of each camp unit, or trash receptacles may be provided at each site.

C. Spacing and Landscaping. Sites will be spaced to allow an average of 75 feet between sites and a density of approximately 2.5 sites per acre. Dense landscape planting providing both canopy and understory vegetation will be maintained within camping areas whenever possible to provide each camping group with a sense of privacy. However, each camping area will include some campsites with multiple spurs and central cooking and eating areas to accommodate groups of campers.

D. Camping Facility Types. Four different types of camping areas will be provided at John H. Kerr Reservoir to meet a variety of visitor needs. Each major type is described below:

1. Class A Camp Units. Each Class A unit will be provided with a gravel or paved car/trailer parking spur (12' x 70') with a maximum slope of 2 percent on the rear half of the spur. Also to be included are one lantern post, one picnic table, a fire ring or grill, one trash receptacle, an enclosed gravel impact area (approximately 800 sq. ft.), a site identification marker, and water and electrical hookups. These items and site preparation and grading are included in the cost of each unit. Impact areas and spurs should be related so that the site may be used by a tent camper, pop-up camper, van, trailers, or any other type of recreational vehicle. Figure A-08 illustrates the basic components of a Class A camp unit. All Class A and B camping areas with 50 or more units will have one fishing dock for use by campers only.

2. Class B Camp Units. Class B camp units will provide the same facilities as specified for Class A unit with the exception of the water and electrical hookups. Water will be provided by water spigots at a rate of one for each 8 campsites to be centrally located for those sites.

3. Primitive Camp Units. Access to primitive camp units will be provided by trails and boat access. One boat mooring post and one car space will be provided for each unit. Service roads will be sited from a convenient staging area to the camping area for maintenance vehicles and hiking to the area. Each unit will have a gravel surfaced impact area of approximately 650 square feet with a picnic table, a fire circle and lantern post.

Impact areas should be sited to take advantage of good views and to minimize site disturbance. In sloping areas, terraces may be created to provide for a level impact area. Tent pads and picnic

areas may be placed at different levels but ideally they should be on one level surface. An example of terracing to provide a level impact area is shown on Photograph A-01. The photograph also demonstrates the use of an impact area shape which fits the site and orienting the site to take advantage of good views. Centralized trash collection facilities will be provided at each vault toilet (one for each 8 units). Each of the camp units will be spaced a minimum of 125 feet apart. A network of hiking trails will be provided throughout the area for access to campsites, pit toilets and mooring posts. Figure A-09 demonstrates an ideal layout and relationship between components of a primitive camping area. The Figure shows sites with maximum orientation to the reservoir, centralized location of mooring posts, and pit toilets which are above flood levels. The sites are easily accessible from the parking lot and road for maintenance and from all sites for convenience of users. A trail network is also shown which provides access to the toilets, parking area, mooring posts and to all sites.



PHOTOGRAPH A-01

TYPICAL PRIMITIVE CAMP UNIT.*

*Shows the components and layout of a typical primitive camp unit. Final design of individual units will vary with site characteristics. A fire ring or grill will be provided.

4. Group Camp Areas. Areas will be provided for use by organized groups such as Boy Scouts, Girl Scouts, social groups, church groups, etc. Two sizes of group camp areas will be sited to meet the needs of various sizes of groups including a small group area for 30 people and a large area for up to 150 campers.

a. Small Group Camp. Facilities at small group camp areas include 10 paved car parking spaces, one pair of pit toilets, one water well with a hand pump, centralized trash collection at the pit toilets. an area with cleared understory for tents.

b. Large Group Camp. Facilities at a large group camp include a centralized parking area for 30 cars, 4 pairs of pit toilets, trash collection facilities at the pit toilets, security lighting at the parking area, a water well with hand pump for water supply and a council group area with a fire circle and log seating. The understory will be cleared from an area for tent sites.

E. Sites for the Handicapped. At least one camp site in each area should be designed for use by the handicapped, preferably the sites nearest to a washhouse or comfort station. Design considerations for these sites include paving impact areas, providing paved pathways to the site, providing picnic tables which can accommodate wheelchairs, and providing curbs around the area. These sites should be as level as possible and without any changes in grade.

F. Sanitary Facilities and Utilities

1. Class A and B Camp Unit Area. All Class A and B camping areas will be provided with waterborne sanitary facilities. All camp units will be located within 300 feet of a comfort station or washhouse, and not more than 600' from a washhouse. Facilities located in these areas will be distributed as described in EM 1110-2-400 with a comfort station for each 50 camp units and a washhouse for each 50 to 100 units in addition to the comfort station.

Class A units will have individual water supply and Class B units will have a water spigot for each 8 camp units.

2. Primitive Camp Unit Areas. One pit toilet will be provided for each 8 camp units, and a well with a hand pump will be provided for each 25 camp units.

3. Group Camp Areas. Small group camp areas will have one pair of pit toilets and one well with hand pump for water supply. Large group camp areas will have four pairs of pit toilets sited on the perimeter of the area and have one well with hand pump centrally located for water supply.

4. Trailer Dumping Stations. Class A and B camping areas will be provided with a trailer dumping station for the discharge of recreational vehicle holding tanks. EM 1110-2-400 requires one sanitary waste dumping station for each 50 - 200 campsites, with a second station for areas exceeding 200 spaces. The final design of each trailer dumping station will be determined by the availability of sewage disposal facilities and the anticipated size and use of the camping area in which it is located. Sanitary disposal stations will be located close to the exit of the area they serve, and will allow users to conveniently re-enter the camping area. Figure A-10 shows a typical "island" type trailer dump station which is accessible from both sides.

G. Playgrounds. One playground will be provided at each major camping area. Playgrounds are discussed in Section 11 of this chapter. The size of each playground will be determined by the size and estimated use of the camping area in which it is located.

H. Amphitheater. A small amphitheater will be provided to serve each of the major camping areas at the project. These amphitheaters will consist of a cleared area in a natural setting with bench seating. The capacity of the area will be based on anticipated use. In addition, 1 permanent screen, 1 projector pad with electric outlet, 3 refuse containers, and 1 council fire ring will be included in the cost of each amphitheater.

I. Typicals. Figures A-08 and A-09 show typical camping unit types to be provided and their components.

A-09 PICNIC AREAS

A. Area Development. Facilities to accommodate various day-use activities will be provided at John H. Kerr Reservoir. Picnic areas will be water oriented when possible and will consist of picnic units, picnic shelters, playgrounds, water and sanitary facilities, game fields and game courts, circulation roads and parking areas.

The maximum cross slope in a picnic area will not exceed 15 percent or be less than 2 percent. Each picnic area will include at least 10 units with a maximum density of 12 units per acre. One car parking space will be provided for each picnic unit as a separate cost item.

Informal picnic areas may be provided to meet the demand of picnickers who do not require tables and grills. These areas should consist of fairly level, open grass covered areas with some tree cover, adequate parking spaces and trash receptacles necessary to

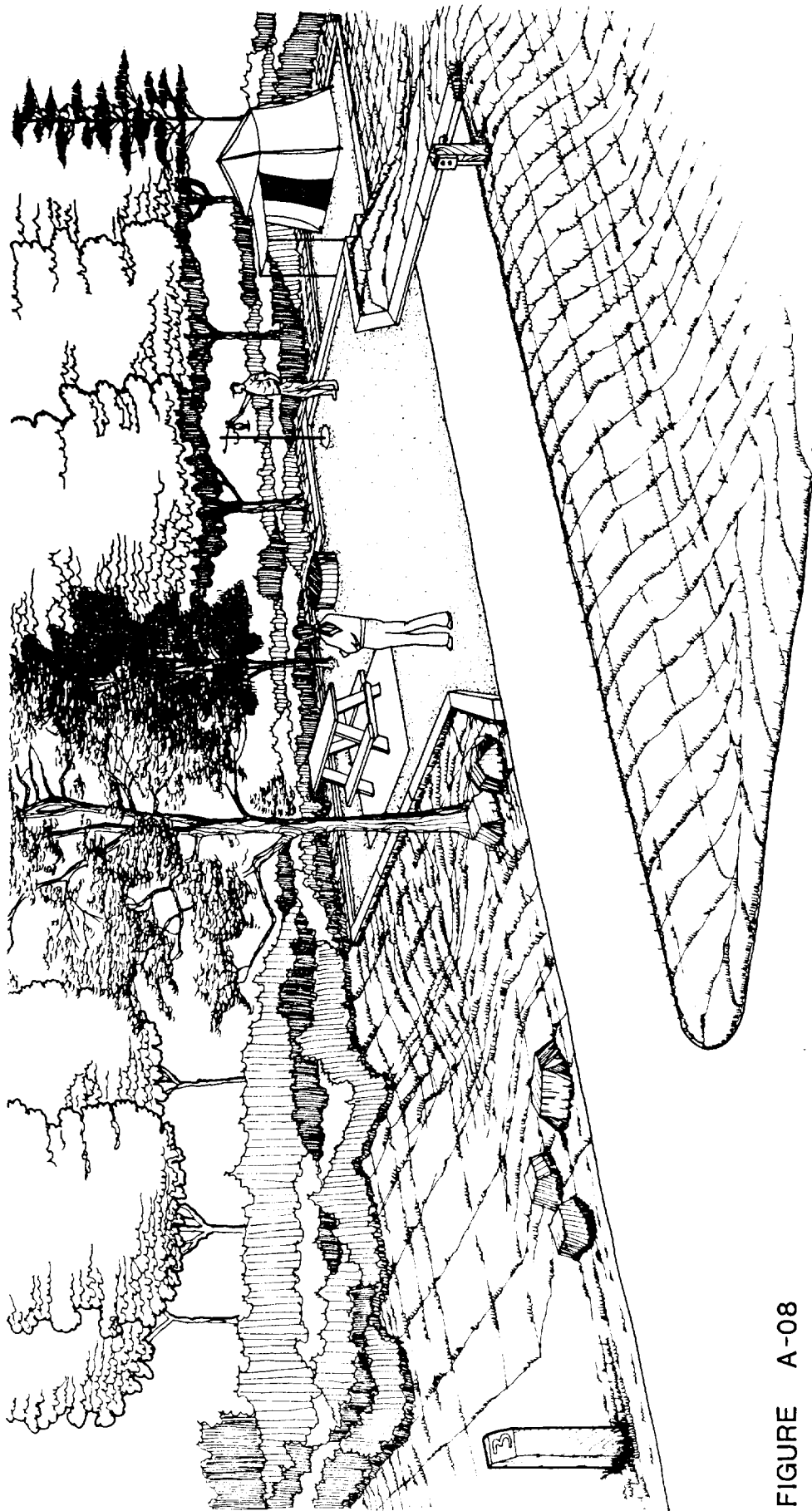


FIGURE A-08
TYPICAL CLASS A CAMP UNIT*

*This drawing depicts the components and possible arrangement of a typical camp unit. Layout will vary due to site characteristics but the relationships should remain as shown here.

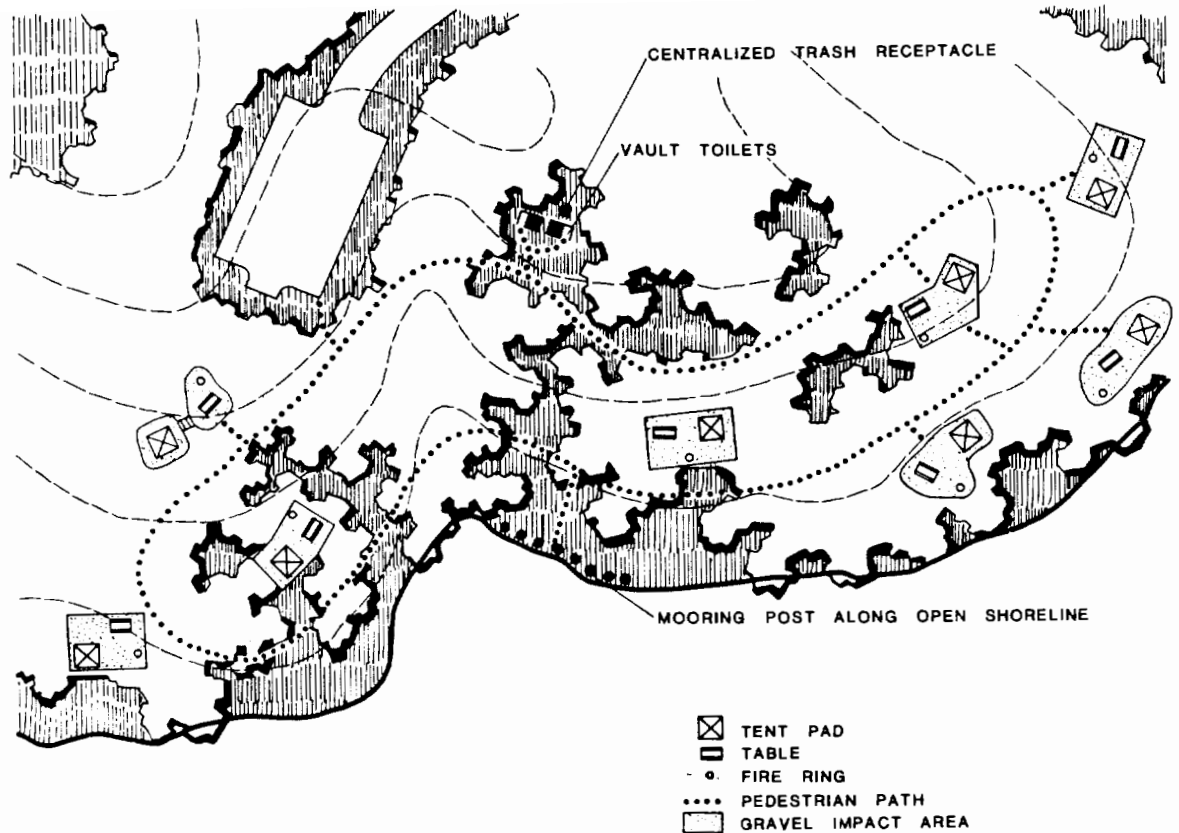


FIGURE A-09
PRIMITIVE CAMPING AREA*

*Demonstrates the components and possible layout of a primitive camping area. Design will be modified to adapt to site characteristics.

meet the needs of the area. A maximum figure of 12 sites per acre should be used to determine the number of parking spaces necessary.

Roads and parking areas should be designed to limit access of vehicles to paved areas only. Ditching along the sides of paved areas, curbs of cast concrete, wheel stops, or wood may be used to control the impact area of vehicles.

B. Picnic Unit. Picnic unit cost items consist of one table on a concrete wearing pad (10' x 10'), and one grill per site, grading,

and one trash receptacle for each three units. One hydrant/fountain is provided for each 10 units or one well with hand pump for an area without waterborne facilities. Picnic units will be spaced a minimum of 60 feet apart.

C. Sanitary Facilities. Comfort stations will be located a minimum of 100 feet and a maximum of 600 feet from the picnic units they serve. In areas that do not have sufficient use to justify waterborne facilities, pit toilets will be used. One comfort station will be located for each 25 picnic units in high use areas.

D. Picnic Shelters. Picnic shelters will be provided at a rate of one shelter for each 35 picnic units and where demand will warrant their construction. Picnic shelters will be designed to accommodate 6, 8, or 12 tables depending on the area where it is to be

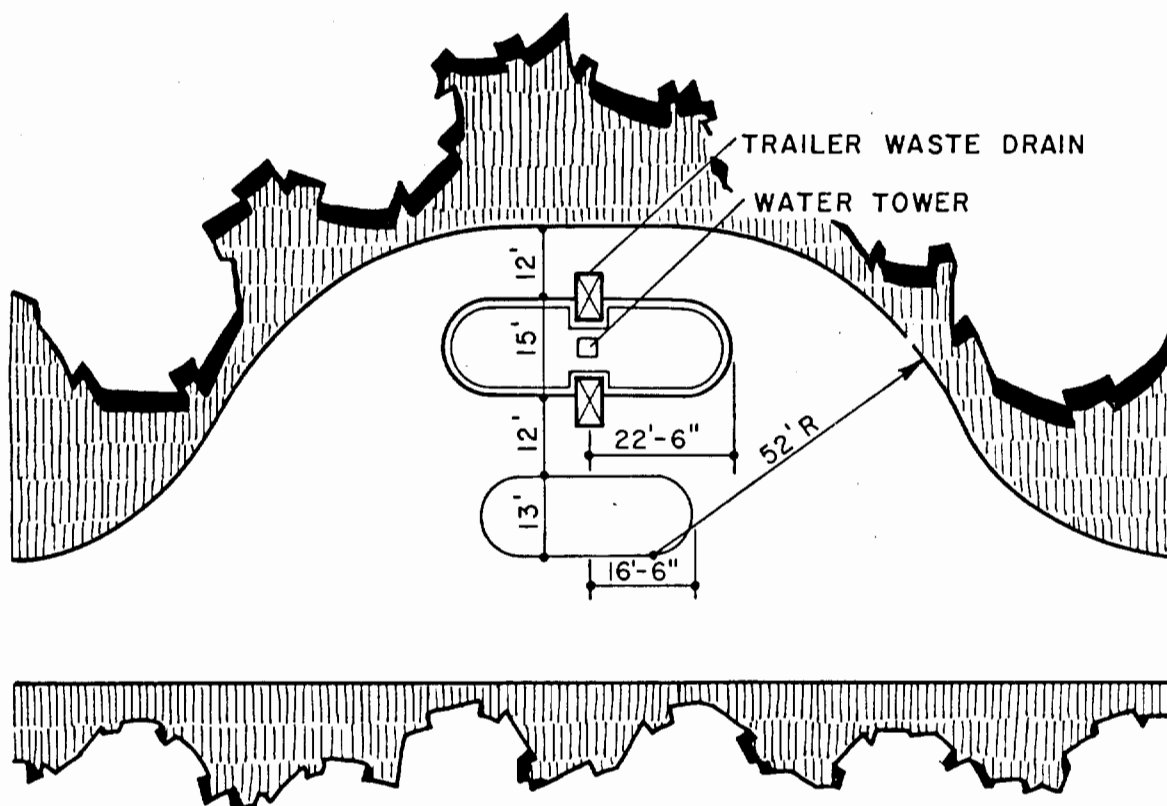


FIGURE A-10
TRAILER DUMPING STATION*

*Shows the dimensions and layouts of a trailer dumping station. Final design may vary with site characteristics.

located. The cost of a picnic shelter included in the cost estimates is for a small size shelter including 6 picnic tables, 4 grills and 4 trash receptacles and a finished concrete floor. The style of picnic shelters will conform to guidelines in Section A-15 "Recreation Area Structures."

E. Playgrounds. One playground will be provided at each area with 30 or more picnic units. Playgrounds are discussed in Section A-11 of this supplement.

F. Open Play Area. Open play areas of approximately one acre in size will be provided at picnic areas with 50 or more units. For cost estimating purposes it is assumed that these areas will be graded for slopes between 2 and 3 percent and will be surfaced with grass.

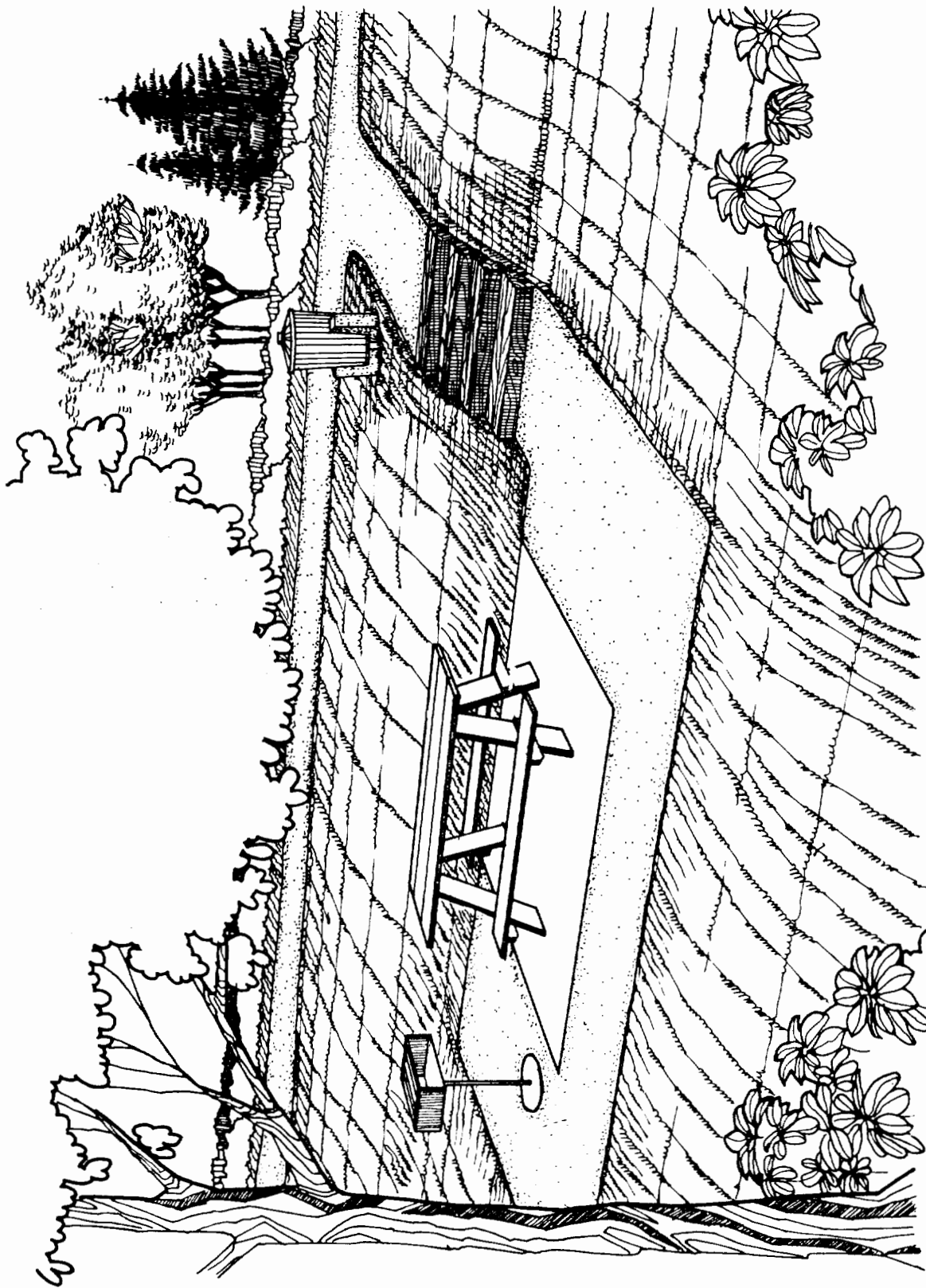
G. Typicals. An example of a typical picnic unit is shown on Figure A-11.

A-10 SWIMMING BEACHES

A. Design Criteria. Swimming beaches will be provided at several areas in the project. In calculating beach needs, the assumptions will be used that each sunbather needs 50 square feet of sand or turf area, each swimmer uses 30 square feet of water area, and that at any given time, 60 percent of the users will be on the beach, 30 percent will be in the water, and 10 percent will be elsewhere. Beaches may be oversized to accommodate visitors when the water levels are higher than normal pool. All beaches will be designed to extend 6' below normal pool elevation or to 294' m.s.l.

Beaches will be surfaced with sand at a slope of 3 to 5 percent. Sand areas will be contained with a concrete curb or a retaining wall of railroad ties where slopes greater than 5 percent occur. A turf sunning area will extend above the sand area. This turf area will be surrounded by a diversion berm to minimize maintenance problems resulting from large quantities of surface runoff moving over the beach area. Large turf areas may be provided with intermittent plantings to provide partial shade and protection from strong winds. Beaches and sunbathing areas should be separated from parking areas with a vegetation buffer strip.

All swimming areas will be zoned and buoyed. The swimming area should be outlined with buoys International Orange in color with cable passing through each buoy and with the cable also supported by flotation material. The buoys should be visible to a swimmer at a distance of not less than 100 feet. Additionally, a



*This figure shows the components of a typical picnic unit. The layout of the components will vary due to site restrictions.

FIGURE A-11
TYPICAL PICNIC UNIT*

minimum of two warning buoys to boaters per area spaced at 200 foot intervals, whichever results in the greater number, should be provided. The warning buoys should be parallel to and 300 feet (desirable), (100 feet minimum) beyond the buoyed safety line defining the swimming area.

The cost of beach areas will be on a square foot unit basis for sand and turf sunbathing area and will include grading of land and underwater area, sand surface, concrete curb, turf areas, the diversion berms and safety buoys.

There are two types of beaches at John H. Kerr Reservoir, the major day-use beaches and minor beaches located in conjunction with large camping areas and small day-use areas.

EM 1110-2-400 requires that beaches extend to the five year flood elevation of 310 m.s.l. at a maximum slope of 5 percent. Therefore, beaches will extend 200 feet horizontally from the normal pool shoreline, causing beaches which meet the minimum user space criteria to be very narrow. For example: a minor beach which will serve 100 campsites requires 3,650 square feet of beach which would be only 18.25 feet wide as demonstrated below:

100 campsites

4 people per site

55% of campers will swim

3 turnover rate

50 square feet of beach per person

$$\frac{100 \times 4 \times .55}{3} = 73 \text{ people at one time at beach}$$

$$73 \text{ people} \times 50 \text{ sq. ft.} = 3,650 \text{ sq. ft.}$$

$$3,650 \text{ sq. ft.} \div 200 \text{ ft. (required minimum beach width)} = 18.25 \text{ ft. of shoreline}$$

A beach which is 200 feet long and provides only 18.25 feet of shoreline does not provide adequate shoreline for the swimmers and is out of proportion. Therefore, beaches will be oversized to provide the 200 foot depth requirement and an adequate shoreline. Oversizing the beaches will also allow use of the beach when the water level is above the normal pool. Much of the oversize area will be turf sunbathing area which may also serve as buffer and open play area.

B. Minor Beaches. Small beaches will be provided at camping areas with 100 or more sites or small day use areas. These beaches will have a sand area of 100 feet long by 60 feet deep with a turf area extending beyond the sand area by 140 feet to the 5-year flood level of 310 feet m.s.l.

A pair of pit toilets will be located at each minor beach. These will be located above the project full pool elevation of 320 feet m.s.l.

Parking for the minor beaches is based on the assumptions that half of the campsites or day-use facilities are within walking distance to the beach. 55 percent of the visitors will swim, a turn-over rate of 3, and one car space is needed for four swimmers.

C. Major Beaches

1. General. Major beaches will be located in conjunction with other major day-use facilities at recreation areas, and will be designed to accommodate 600 people at one time. These beaches will have a sand area extending 100 feet back from normal pool elevations and a shoreline of 200 feet. The turf sunbathing area will extend the shoreline to a total of 250 feet and the depth to 200 feet to accommodate visitors when the water level is above normal pool. Each major beach area will have trash receptacles and water fountains. A floating platform for diving should be considered during the design stages of beaches. At heavily used beaches, a paved walkway should extend from the parking area to the water level to provide access for the handicapped and a portion of the beach may be paved with a non-skid surface to allow the handicapped to enter the water.

2. Parking. To determine the parking requirement we must assume that some of the swimmers will be parked at other nearby facilities and there will be four swimmers per car. Therefore, parking areas at major beaches should accommodate 125 cars. Parking areas will be placed as close to the beach area as possible while maintaining a buffer and screen area between the parking area and the beach.

3. Bathhouse. A bathhouse will be provided at all major beach areas within 400 feet of the sand beach area. The bathhouse will be sited above the flood control pool elevation (320 feet m.s.l.). Each bathhouse will provide dressing areas, toilets, shower facilities, clothes basket storage and a concession area if it is desired by the cost sharing partner.

4. Typical. A typical major beach area is shown on Figure A-12.

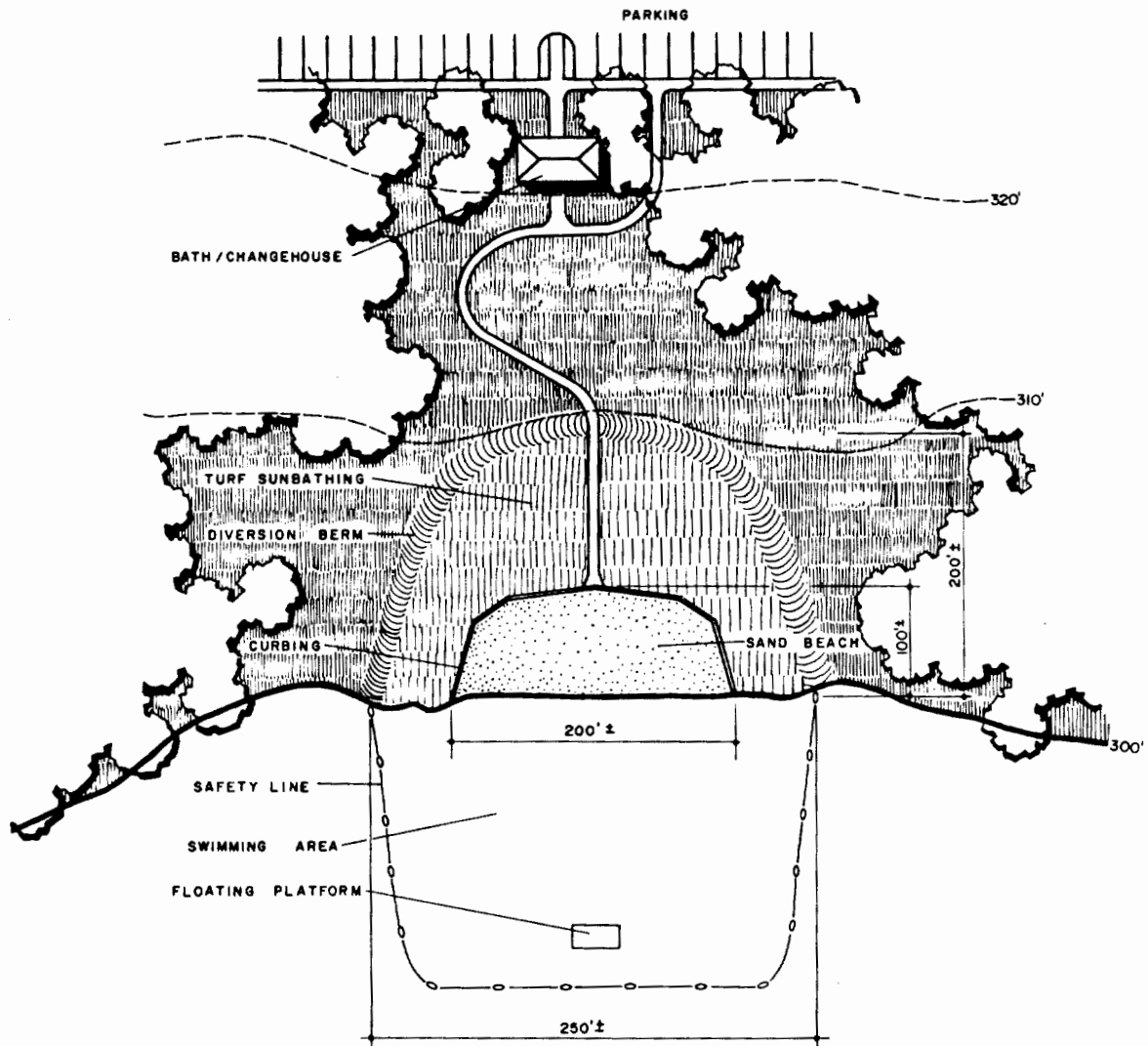


FIGURE A-12

MAJOR BEACH AREA*

*Typical layout of a major beach area. The final design may vary to meet the site characteristics.

A-11 PLAYGROUNDS

A. General. A minimum of one playground will be provided in each major recreation area. Playgrounds will consist of two acres of relatively flat, open or partially open areas for games and equipped with play structures such as slides, climbers, swing

structures, etc. Play apparatus used will be rustic in appearance and in accordance with SOP No. 7. Appropriate surface materials to be placed around the structures include sand, shredded bark, turf, and smooth pea gravel. The open play area for games will be surfaced with turf.

The cost of playgrounds will include grading, seeding and landscaping, play area surface and play structures, two wood park benches, two trash receptacles, and labor.

B. Design Criteria. The following general guidelines apply to all playground development.

1. Playgrounds will be located near the major use areas within each site in a manner that does not conflict with pedestrian or vehicular traffic patterns.

2. Playgrounds will be landscaped to provide partial shade if the site does not provide it.

3. Open turf areas will be preserved adjacent to playgrounds whenever possible to provide opportunities for field games and free play activities.

4. One playground will be provided for each camp area with 50 or more units and picnic areas with 30 or more units.

5. Use TM 5-803-11, Childrens Play Areas and Equipment, January, 1969, as general criteria for layout and sizing of equipment.

6. Orient all metal slides in the northeast quadrant to prevent the possibility of children being burned by hot metal surfaces.

7. Refer to available manufacturers of this type of equipment for possible layouts and recommended capacity of equipment.

C. Typical. An example of a playground is illustrated in Figure A-13.

A-12 TRAILS

A. General. Trails will be used where they enhance public enjoyment of the environment and for utilization of fish and wildlife resources. Important factors to consider when designing a trail include alignment, terrain, topography, vegetation, aesthetic values, points of interest, road crossings or other potential dangers, and final destinations.

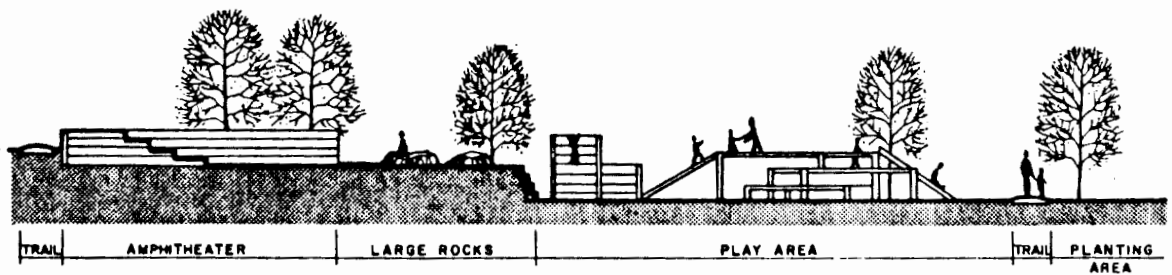
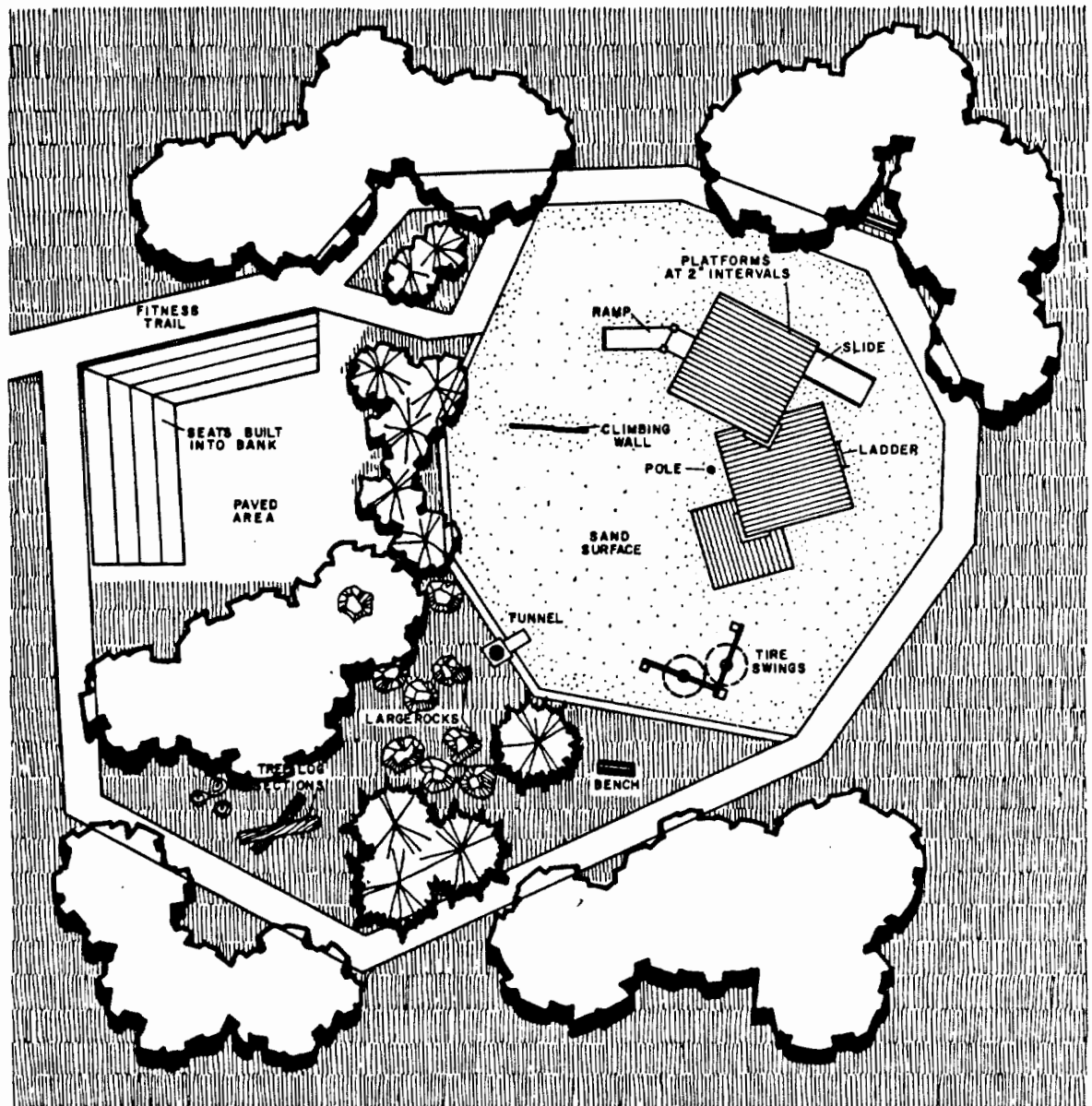


FIGURE A-13
TYPICAL PLAYGROUND*

*Possible layout and components of a playground using naturalistic materials. Final design of playgrounds will vary due to size of area and site characteristics.

Zoning of trails for various types of use intended is also necessary. Trail types to be provided at John H. Kerr Reservoir include interpretive, bicycle and hiking trails. Hiking trails will provide secondary benefits by providing access for security, fire control, etc.

B. Design Criteria (General). The following general guidelines are applicable to all trail development.

1. Brush or native rock materials should be placed where necessary to prevent erosion.
2. Trails should be routed around large trees where practical to avoid unnecessary tree removal.
3. Trails should be inspected periodically to check trail conditions and markings.
4. Trail maps should be available and should include a markings legend.
5. Pedestrian trails should be used for foot travel only except where access roads will be used by both pedestrians and maintenance vehicles. Trails which are designated for pedestrian use only will be closed off with barriers such as logs, bollards, zig-zag bridges, and stairways to discourage non-pedestrian users.
6. Trails should avoid steep slopes but where trails must traverse in steep areas, side-hill construction techniques will be utilized. The cut slopes may be as steep as the soil material will tolerate without risking serious erosion.
7. All trail construction should be planned to produce the least disturbance to the natural environment, consistent with the intended use.
8. Trails should provide a variety of experiences, taking advantage of views (vistas and intimate), traversing ridges and valleys, open spaces and forested areas, and traveling along water bodies whenever possible.
9. Curbs and/or handrails should be provided where appropriate.
10. Inter-site walkways will be provided to link major recreational facilities.
11. Abrupt changes of direction or grade will be avoided.

12. A well lighted parking area will be provided at all major trail heads.

13. The lineal foot unit cost for each trail type includes the construction of the trail, surface materials, stairs, curbs, handrails, signage, and grading.

C. Bicycle Trails. The Virginia S.C.O.R.P. denotes a great demand for bicycle trails in the area of John H. Kerr Reservoir. The integration of bicycle trails should be considered during further design stages of recreation areas for both trails within sites and trails connecting recreation areas. Most hiking trail alignments are also conducive to bicycle trails, therefore, where funds are available, hiking and bicycle trails may share the same path or, ideally, exist side by side.

D. Signage. Adequate signage is essential at trail heads, intersections, points of interest, and at locations of the trail where the direction is not readily discernible. Trail signs should include mileages to various points of interest along the way, along with the total trail mileage. Frequent mileage markers along the trail are helpful to the hiker and useful in the operations and maintenance of the area. The cost of trail signs has been included in the lineal foot unit costs for each trail type.

E. Surfacing. Surfacing is a costly item in trail construction. Therefore, natural materials will be used wherever feasible. Asphaltic concrete material will only be used on trails for the handicapped, bicycle trails, and on trails with concentrated use. Wood chips, gravel or other natural surfacing materials will be used for most hiking trails and interpretive trails that are not designed for use by the handicapped.

F. Typicals. Typical trail sections are shown on Figures A-14 to A-17. These typicals show minimum and maximum grades for the trail types, surface materials, trail width and other pertinent information.

G. Trailside Rest Area. Trailside rest areas will be provided on long sections of hiking trails. These rest areas will include 2 park benches on a 6 foot by 15 foot gravel impact area. One trailside rest area will be located for every two miles of trails and will be included in the cost of the trail.

H. Footbridges. Footbridges will be used to span drainage ways when they are encountered on trails and other treatments are not feasible. Bridge design will be determined during the Feature Design Phase. Bridges will be built of rustic materials to blend in with the surrounding area. An example of a suitable bridge is shown

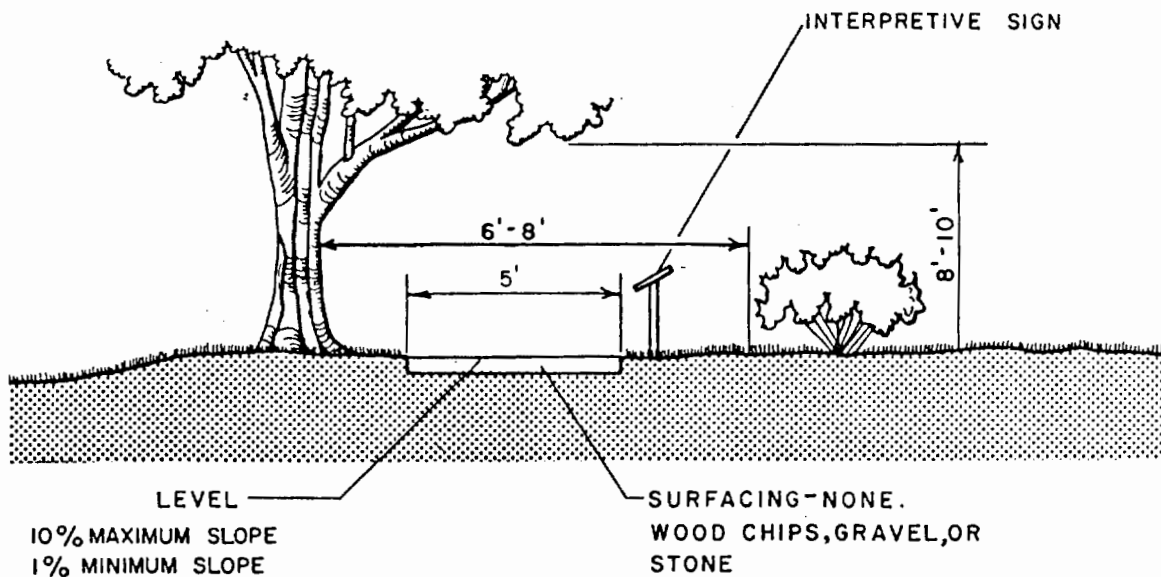


FIGURE A-14
INTERPRETIVE TRAIL*

*These drawings are a general guide for the construction of trails.
The final design may vary due to slope and other site characteristics.

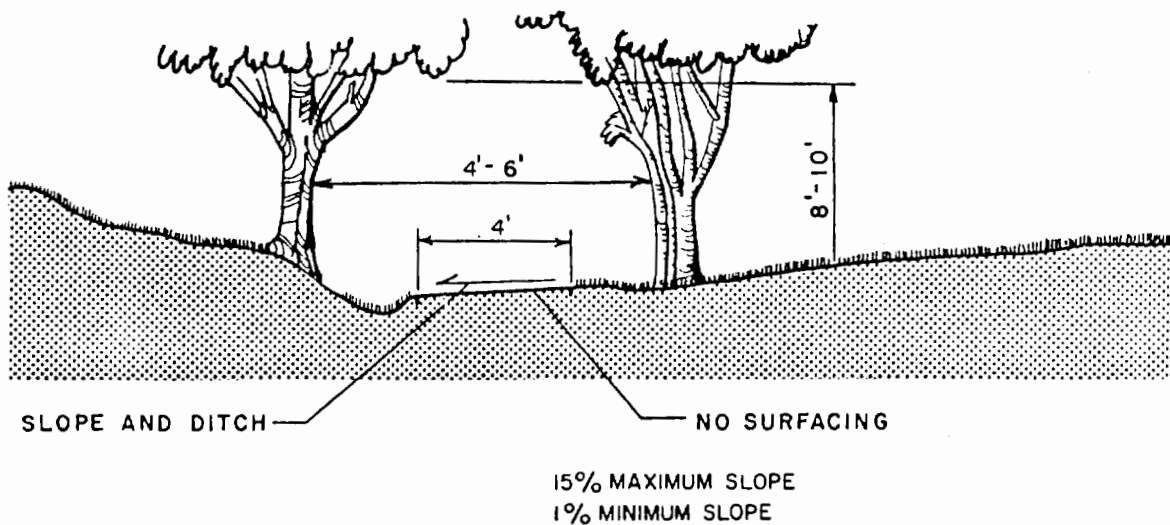


FIGURE A-15
HIKING TRAIL*

in Park Practice Program Design, Index B-3139.

I. Special Considerations.

1. Trails for the Handicapped. Trails to be utilized by the handicapped must conform to EM 1110-0-103, 15 October, 1976, Page 4-5, 4-6, specifically as given below.

- a. Minimum width of 6 feet continuous uninterrupted by any abrupt change in level.
- b. Use slopes no greater than 1 in 24 (4.2%), blending to a common level with landings, other trails, and parking lots. When slopes exceed 1 in 30 (3.3%), provide level landings at least 6 by 6 feet at 60 foot intervals for the purpose of rest and safety.
- c. For trails which terminate at doorways of recreational structures, provide a level landing at least 6 by 6 feet, extending a minimum of 18 inches beyond the strike jam of the doorway.
- d. Make surfaces fixed, firm and non-slip for water drainage, surfaces may be crowned at 1/8 inch per foot.
- e. Grade the ground surface up to the edge of the trail surface and compact to avoid having a drop-off. Where grounds drop-off or recede at slopes greater than 1 in 6 (16.5%), provide a 42" high guard rail.
- f. Set all lighting elements, sign posts and furniture back from trails at least one foot. Trail furniture (benches, etc.) will be placed on surfaces that are fixed, firm and non-slip.
- g. New landscape elements should be planned to allow clearance of at least one foot on sides and at least 7 feet vertical from the trail.

A-13 SIGNS

A. General. A well-planned sign system is a necessary component of the project's circulation system. All future signs will be designed and located in accordance with SADvP 1130-2-1, 1 September, 1978, "Project Signs at Civil Works Projects" (SAD Sign Handbook).

It is important that all signs throughout the project are consistent with one another for positive project identification.

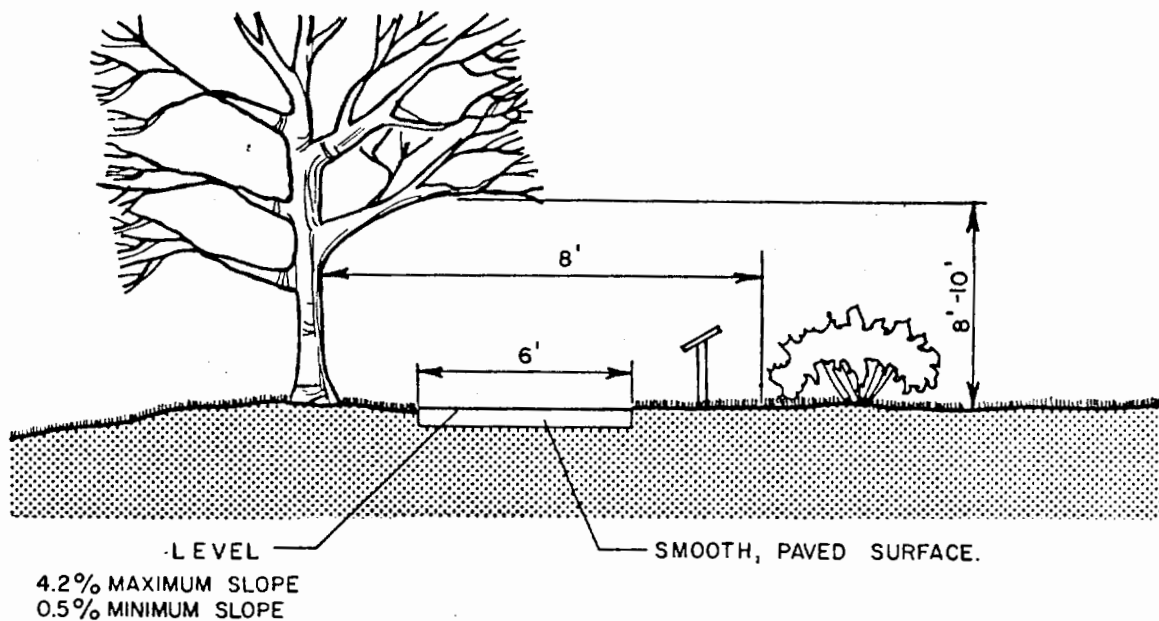


FIGURE A-16
INTERPRETIVE TRAIL FOR HANDICAPPED*

*These drawings are a general guide for the construction of trails.
 The final design may vary due to slope and other site characteristics.

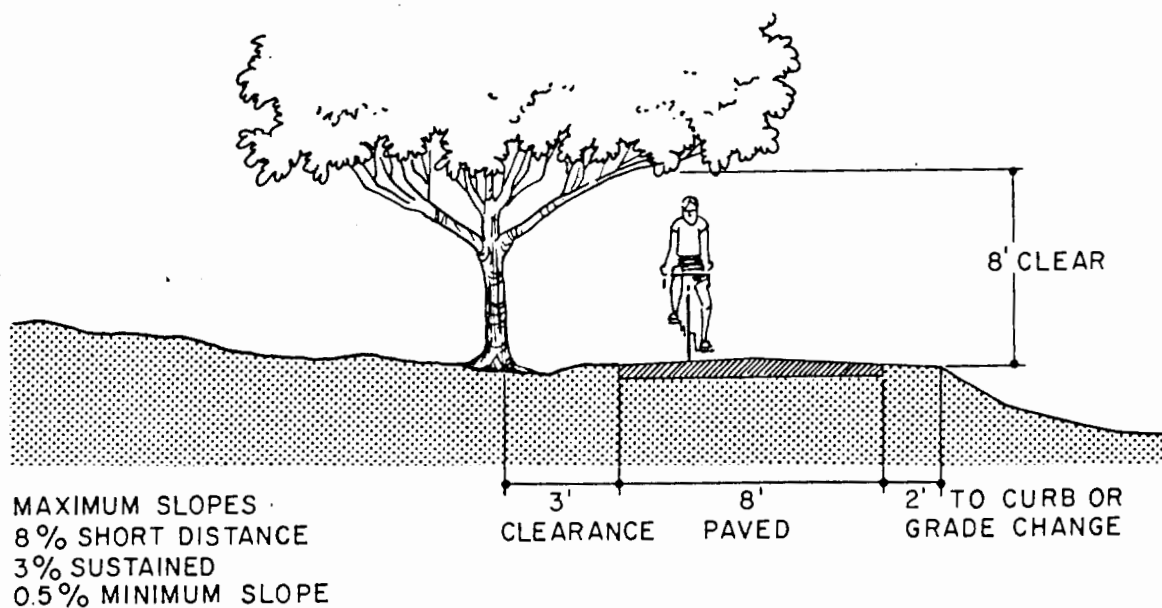


FIGURE A-17
BICYCLE TRAIL*

Therefore, consideration should be given to modifying all existing signs to conform to one set of standards (as presented in the SAD Sign Handbook) as these signs are replaced due to natural deterioration or vandalism.

B. Types and Constructions

1. Entrance Signs. These signs will be located at all major recreation areas, constructed of rustic materials, and convey a concise message consisting of the name of the area and managing agency. Supplemental information and directional arrows will not be placed on entrance signs, but will be located at appropriate points within the area.

2. Information Signs. These signs will be used in conjunction with project structures, recreation areas, and appropriate resource management areas. These signs will be of a design that is compatible with the surrounding areas as described in the SAD Sign Handbook.

3. Information Bulletin Boards. Information bulletin boards will be located wherever they are needed to convey pertinent information to the visiting public. They will consist of materials as described in the SAD Sign Handbook.

4. Traffic Control Signs. All traffic control signs will also be in accordance with criteria in the SAD Sign Handbook. These signs will be placed where appropriate within the recreation areas to control the flow of traffic. The cost of these signs are included in the cost of roads.

C. Other Considerations

1. Wordless or Symbol Signs. Corps of Engineers' Recreation Area symbols will be utilized in sign design wherever possible. These signs will have white symbols on a brown background.

2. Historical or Interpretive Signs. Signs placed at overlook areas, information signs and bulletin boards conveying historical or interpretive data will be of a rustic design in harmony with the surrounding area.

3. Consolidation of Signs. All signs that present messages pertaining to rules, regulations, project data, or other general information will be consolidated whenever possible on a display board along with other desirable information.

A-14 NAVIGATION AIDS

Small boat navigation aids at John H. Kerr Reservoir will include warning, directional, caution, and control buoys. Boat ramps and marinas will provide lighting to guide evening fishermen and other boaters back to shore. Potential shallows created by drawdowns will be identified as danger areas and buoyed accordingly. Storm warning flags and lighting should be added at several places around the reservoir. Other hazard areas will also be identified.

Boating courtesy and safety rules will be posted at all launching ramps and marinas to promote safe and enjoyable boating experiences. As a safety measure for boaters, storm warning flags and/or lights may be provided at major launching areas and marinas to warn boaters approaching dangerous weather conditions.

A-15 RECREATION AREA STRUCTURES

A. General Design Criteria. The development of detailed design documents for all the proposed structures will be based on the following design criteria:

1. All major buildings must present a positive image to the public.
2. The functional areas of the building must be discernible to provide for efficient usage.
3. Facilities will be designed for minimum maintenance and operational expenses, and will be as vandalproof as possible.
4. The design of all structures will reflect the environment which is characteristic of the John H. Kerr Reservoir Area. Natural materials that are attractive, visually unobtrusive, and that weather and age well will be utilized. An example would be using cedar shakes and siding.
5. Natural lighting and ventilation will be optimized to reduce operational costs and to enhance the personal use of structures.
6. The use of solar power should be investigated for all buildings and structures to reduce energy costs.
7. The same architectural style and materials will be used throughout the project to provide continuity.
8. Any structures to be located in probable flood zones will be constructed to withstand the effects of flooding.

9. All structures within areas designated as handicap-use areas will be designed to provide barrier-free access to facilitate use by elderly and handicapped visitors.

10. All major structures will be designed to fit individual site characteristics.

11. The foundation design of each building will be based upon the allowable gross soil bearing capacity of each site which will be determined during the Feature Design Memorandum Phase.

12. Design loads and allowable stresses. For North Carolina construction use N. C. State Building Code, Volume I, "General Construction", 1978 Edition; for Virginia use the Basic Building Code (BOCA), 1978.

B. General Architectural Character. Building materials that are native to the area and compatible with the colors and textures in the environment will be used in the construction of all structures. The architectural style of all buildings shall be as consistent as possible. The general architectural style for structures at John H. Kerr Reservoir is shown on Figure A-18 and A-19 which were taken from the April 1979, Feature Design Memorandum for John H. Kerr Dam and Reservoir and Philpott Lake.

C. Description of Proposed Structures. The following paragraphs and figures describe the major structures and other design components that have been proposed in this master plan. The cost of all structures as shown in Chapter 10, includes the structure, all items within, grading and the cost of utilities within five feet of the structure.

1. Sanitary Facilities. All bathhouses, washhouses, and comfort stations shall conform to the specific fixture requirements to satisfy visitor demand as described below. All plumbing for fixtures shall be located on interior walls, be accessible from an interior utility room, and be sloped to a central drain point to facilitate draining during off-season periods. The utility area shall also provide for electrical panels, water storage, and supply storage. These buildings will not be heated or air-conditioned. The design shall make maximum use of natural ventilation and natural light while providing the proper degree of privacy. The buildings shall have exterior lights, water fountains, walks, and trash facilities.

a. Bathhouse. Each bathhouse shall contain a women's area, men's area, utility room, storage and basket check area. The fixtures in the men's and women's area shall be based upon the visitation use at each beach area (See Table 8-02), re: "Park Planning Guidelines", by

TABLE A-02
STANDARDS FOR SIZING OF SANITARY FACILITIES*

MALE BATHHOUSE					
NO. OF MALES	NO. OF TOILETS	NO. OF URINALS	NO. OF LAVATORIES	NO. OF SHOWERS	NO. OF CHANGE ROOMS
1 - 50	1	1	1	1	1
51 - 100	1	1	1	2	2
101 - 250	2	2	2	3	4
251 - 500	2	3	2	4	6
501 - 750	3	3	3	4	7
751 - 1000	3	4	3	5	8
1001 - 1500	4	5	4	6	10
1501 - 2000	5	6	5	7	12

FEMALE BATHHOUSE				
NO. OF FEMALES	NO. OF TOILETS	NO. OF LAVATORIES	NO. OF SHOWERS	NO. OF CHANGE ROOMS
1 - 50	1	1	1	1
51 - 100	2	1	2	2
101 - 250	3	2	3	4
251 - 500	5	2	4	6
501 - 750	6	3	4	8
751 - 1000	7	3	5	9
1001 - 1500	9	5	6	11
1501 - 2000	11	5	7	13

*Fogg, George E., Park Planning Guidelines, 1975.

George E. Fogg, 1975). Since this structure is one of the largest that will be built in a recreation area, consideration should be given to heating water with solar power.

b. Washhouse. Washhouses shall serve camping areas at the rate of one each to serve a minimum of 50 spaces and a maximum of 100 developed spaces in addition to comfort stations required. Each washhouse shall be sited to be a maximum of 600 feet from the farthest space. Each washhouse shall contain a women's area, men's area, utility area and laundry area. The women's area shall contain 4 showers, 4 lavatories, and 4 water closets. The men's area shall include 4 showers, 4 lavatories, 3 water closets and one urinal. The utility area shall be as described above. The laundry area shall contain 2 laundry tubs and a built-in table. (Re: EM 1110-2-400). A typical washhouse is shown on Figure 8-18.

c. Comfort Station. Comfort stations shall contain a women's area, men's area and utility area. The requirements for comfort stations in day use areas and camping areas differ and are described below (Re: EM 1110-2-400). A typical comfort station is shown on Figure A-19.

(1) Camping Areas. Provide one comfort station for each 50 camp spaces. The men's area shall contain 3 water closets, 1 urinal, and 4 lavatories. The women's area shall contain 4 water closets and 4 lavatories.

(2) Day-Use Areas. Provide one comfort station for each 2,500 normal summer weekend day visitors. The men's area shall contain 2 water closets, 2 urinals and 2 lavatories. The women's area shall contain 4 water closets and 2 lavatories. Site facility 100 feet minimum from the nearest picnic table.

d. Pit toilets. Pit toilets shall be provided as specified below in camping areas and day-use areas as required, and shall contain a women's side and a men's side.

(1) Camping Areas. Provide pit toilets only for those sections of camp areas that are more than 300 feet from the nearest waterborne facility. Provide 2 single units (one seat each sex) or one double unit (2 seats each sex) for each 5 - 10 spaces. Site facility not farther than 300 feet from farthest space.

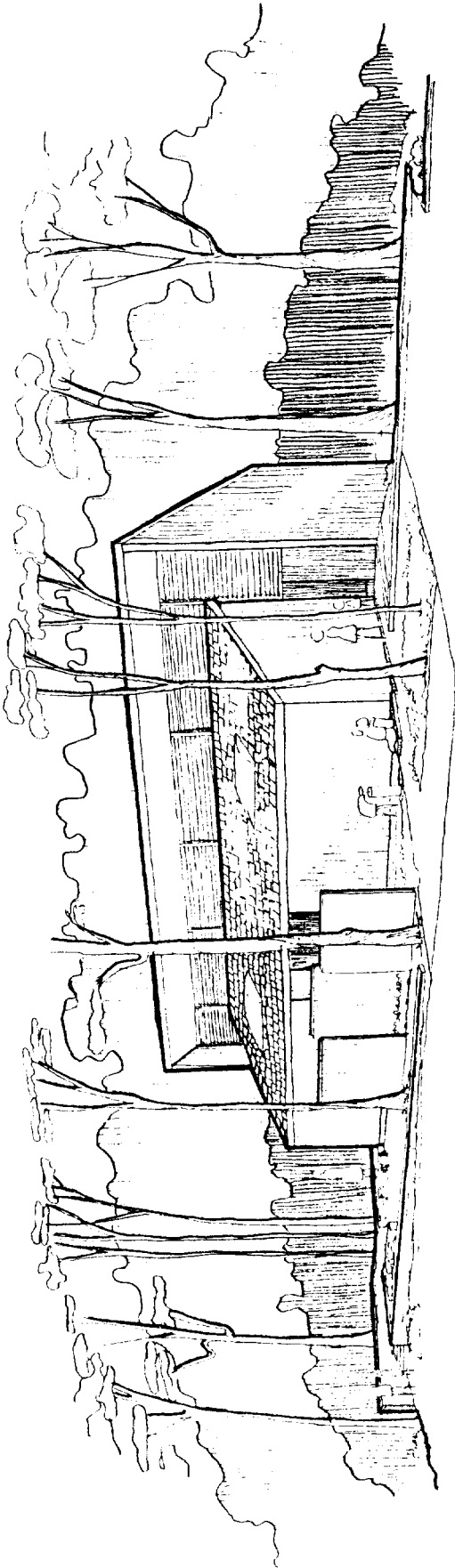


FIGURE A-18
TYPICAL WASHHOUSE

SKETCH FROM 'RECREATIONAL PARK DESIGNS',
FEATURE DESIGN MEMORANDUM FOR JOHN H. KERR
DAM & RESERVOIR AND PHILPOTT LAKE, APRIL 1979.

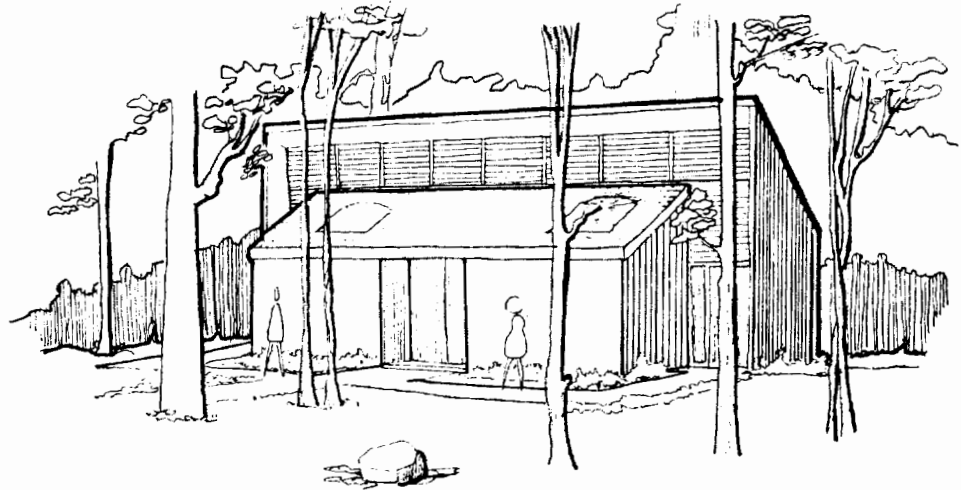


FIGURE A-19
TYPICAL COMFORT STATION

SKETCH FROM 'RECREATIONAL PARK DESIGNS',
FEATURE DESIGN MEMORANDUM FOR JOHN H. KERR
DAM & RESERVOIR AND PHILPOTT LAKE, APRIL 1979.

(2) Day-Use Areas. Pit type toilets will be used only in those areas where the level of use does not warrant a better facility (expected annual visitation of 50,000 or less). Provide one double unit (2 seats each sex) for each 1,500 normal weekend visitors. Site pit toilets a minimum of 150 feet from nearest table.

e. Water and Sewage Demand Load Criteria. The water and sewage load requirements of the buildings and recreation areas will be determined by the visitor use rates as given in Table 8-03 (80% of water demand = sewage flow). These values will be used in conjunction with the required fixtures and visitation to determine the capacity of the water systems and sewage systems which are discussed later in this chapter.

2. Control Booth. A control booth shall be provided at the entrance to recreation areas requiring a user fee and shall be in accordance with guidelines established in S.A.D. SOP No. 5 for campgrounds. Control booths shall be sited such that the attendant(s) will be able to collect fees and observe visitors entering and

leaving the area, if standing inside the building or outside. Booths shall be lighted, have a telephone and provide good protection from the elements. Adequate shelving shall be provided for storage of information and user materials. During final design stages, consideration should be given to placing restroom facilities in the booth for use by attendants, especially where a restroom is not located in the immediate vicinity. Control booths without a restroom will have an area of approximately 6 ft. by 6 ft. and a booth with restroom facilities will have a floor area of about 6 ft. by 12 ft. Figure A-20 shows a sketch of a typical control booth.

3. Picnic Shelters. Picnic shelters were previously discussed in this document in Section A-09-D. They shall be designed in the same architectural style as the other buildings, shall accommodate a minimum of 6 picnic tables, and be developed with a secondary impact area around the shelter with grills and benches allowing for overflow. They shall be open structures with a fireplace and a concrete slab floor.

4. Fish Cleaning Shelters. Will be provided in areas of concentrated fishing use (50 or more normal weekend fisherman users). Will be open-air well ventilated structures supplied with water spigots, scaling and cleaning benches, drains and solid refuse containers. Shelters will have screened drains to prevent inflow of solids, and a retention tank (vault) for holding liquid wastes, with provision for pumpout. In areas which have adequate sewage disposal system, provision will be made for connecting the waste load from these shelters.

5. Wildlife Observation Blinds. Will be provided at points on the project as shown in the development drawings. An example of the type of blind can be found in the Park Practice Drawing Index No. I-6853 and 6854.

6. Visitor Center/Resource Manager Office. This structure is presently being designed through a separate A/E contract. The design criteria has been presented in the scope of work, and the Phase I Interpretive Prospectus.

A-16 WASTEWATER COLLECTION AND TREATMENT

A. General. Wastewater treatment and collection systems will be required at each recreation area with waterborne sanitary facilities. Treatment systems at John H. Kerr Reservoir will consist of septic tanks with sand filters, tile fields where possible, or recycling systems. The choice of systems for each site will be based on conditions at that site. All wastewater treatment systems will be sized using loading criteria contained in EM 1110-2-400. All effluents will be chlorinated. Areas that are not provided with waterborne sanitary facilities may be provided with pit toilets.

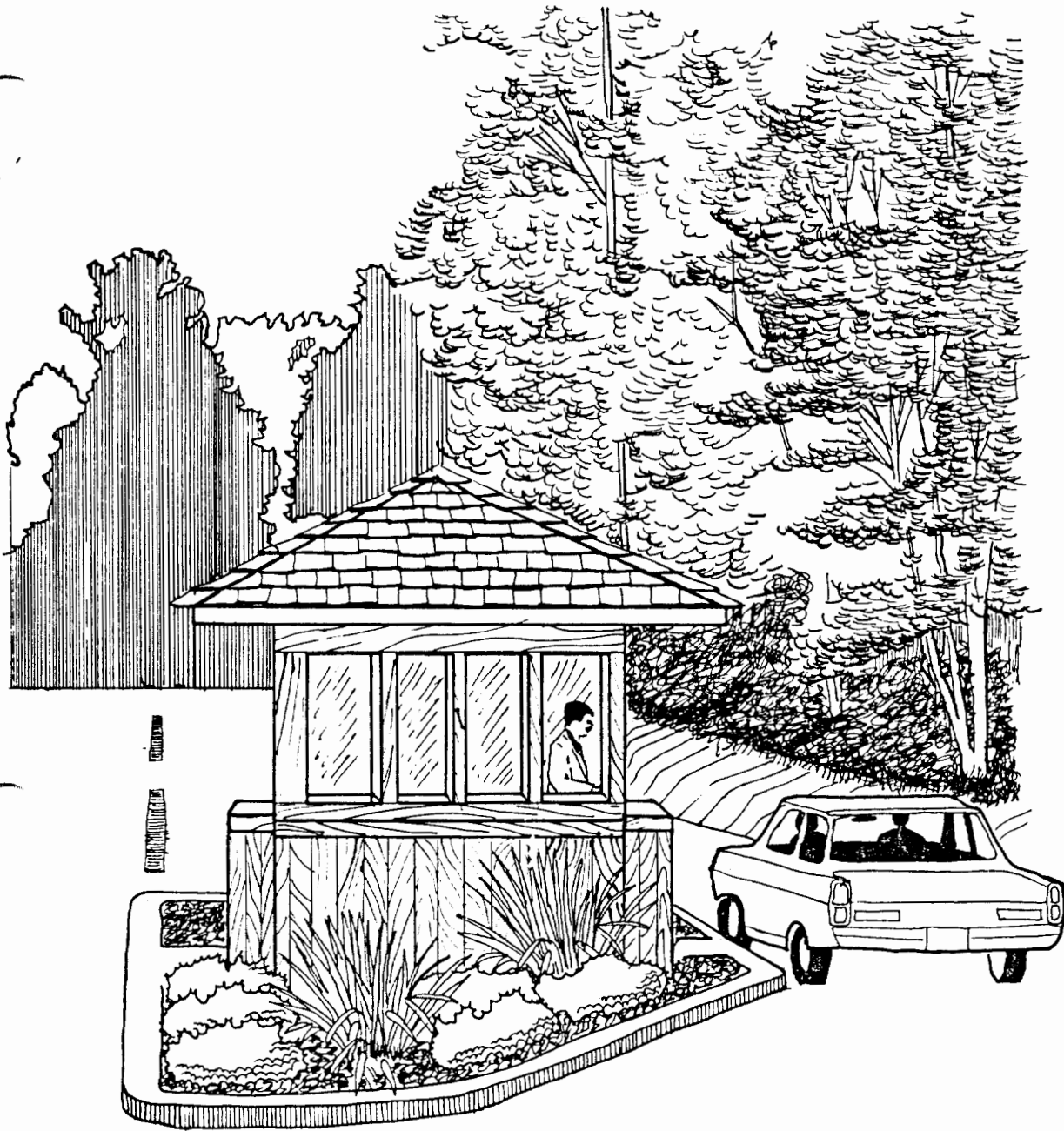


FIGURE A - 20

TYPICAL CONTROL BOOTH*

Figure shows the general architectural character and area treatment of control booths. Layout may vary according to site characteristics.

B. Collection Facilities.

1. Waterborne. Waterborne sanitary facilities include comfort stations, washhouses, bathhouses, and other structures which include restrooms. These facilities are described in detail in Section 15-C of this supplement.

2. Pit Toilets. Pit toilets will only be used in remote, primitive boat-in or walk-in camping areas or other areas where waterborne facilities are not feasible. These areas will be located where they can be serviced by maintenance vehicles.

3. Fish Cleaning Station. Fish cleaning stations will be constructed where use warrants their placement and utility lines are available. Examples of fish cleaning stations are shown in Park Practice Program Design, Index B-3439 and B-3441.

4. Trailer Dumping Station. A trailer dumping station will be provided at major camp areas to collect wastes from recreational vehicles. At the disposal station, the sewage tank of a trailer can be dumped, flushed and water holding tanks recharged with clean water.

5. Marine Dumping Station. All marinas that accommodate house boats with wastewater holding tanks will be required to install a marine dumping station. This station will consist of a floating dumping tank with pumps to move the wastes to pumping stations on the shore.

6. Wastewater Pumping Station. Wastewater pumping stations will be sized according to the Department of the Army Technical Manual TM 5-814-2, "Sanitary Engineering, Sanitary and Industrial Waste Pumping Stations." Pumping stations are provided to pump effluent from waterborne facilities at lower elevations to treatment facilities at high elevations.

7. Force Main. This item will be provided in recreation use areas where sanitary sewer systems are to be developed. Force mains are required for pumping effluent from pumping stations uphill to a sewage treatment facility. Final sizing of force mains will be determined by calculating the head loss due to friction along the pipe and pump sizes in the pumping stations.

8. Gravity Sewer Lines. This item is provided in recreation use areas where sanitary sewer systems are to be developed. Gravity sewer lines are used for piping effluent from waterborne facilities by gravity to lift stations or septic systems.

9. Manholes. This item will be provided in areas where

gravity sewer lines are to be installed. Manholes should be located at changes of direction or slope of the gravity sewer lines, at junctions, and no more than 400 feet apart.

C. Treatment Facilities. Wastewater from most waterborne sanitary facilities at John H. Kerr Reservoir will be treated with systems utilizing septic tanks, sand filters and chlorination. The sand filtration system will be used because of its high quality of effluents and low maintenance requirements. Sand filters will be located at inconspicuous sites where they will not interfere aesthetically or functionally with the use of the site. Generally, one septic tank and sand filter will be provided to serve each waterborne facility except where two minor facilities may be piped into one system. Gravity sewer lines will be used wherever possible to avoid the high cost and maintenance associated with pumping stations and force mains. The cost of wastewater treatment facilities will be estimated on a cost per gallon of wastewater to be treated basis for each recreation area. Methods for determining estimates of sewage flows have been included in part E of this section.

Effluents from package wastewater treatment plants will be inspected on a regular basis to insure compliance with state and federal water quality parameters. Effluent quality criteria for the advanced planning and design of sanitary treatment facilities will be coordinated with the State and Regional Offices of the E.P.A. In some areas it may be necessary to use a system which recycles wastewater. This system would be used in areas where other systems are not feasible.

D. Siting. Waterborne facilities, pit toilets and wastewater treatment facilities will be placed above the flood control pool (elevation 320.0) whenever possible. When it is impractical to meet this criteria, waterborne and pit toilets will be located above the 5-year flood frequency pool (elevation 310.0) and flood-proofed. All wastewater treatment facilities will be located in a manner that causes minimum disturbance to the aesthetic character of the area and provides for safe and efficient operation.

Septic systems and sand filters should be located in areas where the ground water remains at least four feet below the filtration bed and at least 100 feet from water wells.

E. Design Loads. Estimates of sewage flow quantities are necessary to determine the sizes and costs of septic systems. These estimates are based upon criteria stated in EM 1110-2-400, which was used to compile the loads listed in Table A-04, Estimates of Wastewater Flows and Demand on Water Supply. In addition to the load data referenced above, Table A-03 lists other criteria required to estimate the number of people using various facilities. These standards are

TABLE A-03
VISITATION FACTORS INFLUENCING
SEWAGE & WATER SUPPLY FLOWS*

TYPE OF FACILITY	AVERAGE GROUP SIZE	TURNOVER RATE
Camping	4	1
Fishing	3	1.5
Boating	3	1.5
Swimming	4	2
Day Use	3	2
Camping	4	3
Picnicking	3.5	1.6
Hunting	4	1
Sightseeing	3	4
Horse Riding	4	1
Dwelling	4	1
Visitor Center	4	12
Environmental Education	40 (bus)	2
	4 (car)	2

*Wilmington District, Corps of Engineers

the same as those used to find anticipated demand for recreational facilities. Septic tanks will be sized to treat peak weekend demand, and sand filters will be sized based on average weekly demand. Feature Design will consider soil percolation rates and design loads in the design of all wastewater systems.

Table 10-14 lists the facilities to be developed at each future cost-shared area. To determine the sewage flows for these areas, refer to Tables 10-02 to 10-10 which list the items and quantities included in each type of facility. This listing includes peak day

flows in gallons per day. An example is noted here for Boynton Landing.

Boynton Landing: The facilities which are planned for this area are listed on the left column as taken from Table 10-14. The sewage flows for these facilities are listed on the right as shown in Tables 10-02 to 10-10.

Facilities	Peak Sewage Flows Gallons per Day
2 Boat Launch Lanes	1000
50 Class A Camp Areas	4800
50 Class B Camp Areas	4000
25 Class B Camp Areas	2000
1 Minor Beach	<u>1800</u>
	13,600 g.p.d.

The peak weekend, which the septic tank must be designed for, consists of three days at peak flows or, for this example, 3 days x 13,600 g.p.d. = 40,800 gallons. One septic system will be sited for one or more waterborne facilities, therefore, dispersing the total wastewater flow over a number of systems.

The sand filtration systems will be designed to meet the demand of an average week during the peak season, therefore, loads will be admitted into the filter at a fairly constant rate. To determine the average weekly demand for sizing the sand filter, a design factor is applied to the peak day sewage flows. The design factor is based on the ratio of an average day to a peak day during the peak season. With an annual usage (2030) of 4,315,000 visitors per year, it is assumed that 75 percent will occur during the peak season (May 1 to September 15, 138 days) equalling 3,236,250 people. Therefore, the average daily visitation may be derived from this formula:

$$\frac{\text{No. of people in peak season}}{\text{days in peak season}} = \text{visits on an average day}$$

$$\frac{3,236,250}{138} = 23,451 \text{ visits on an average day}$$

There are 44 peak days (Holidays and weekends) during the peak season and in Part 4-06 Section A of this plan, the assumption was noted that 75 percent of the peak season visitation occurs on peak days, therefore, peak day visitors may be determined as follows:

$$\text{Peak day visitors} = \frac{\text{peak season visitors} \times \text{percentage of visitors on peak days}}{44 \text{ (peak days in peak season)}}$$

$$\frac{3,236,250 \times .75}{44} = 55,163 \text{ visits on a peak day}$$

The formula to determine the design factor is as follows:

$$\frac{\text{average day visits}}{\text{peak day visits}} = \text{design factor}$$

$$\frac{23,451}{55,163} = 0.425 \text{ design factor}$$

Apply the 0.425 design factor to the gallons per peak day sewage flow of the waterborne facilities to determine the size of the sand filter:

$$0.425 \times \text{gallons/peak day/person} = \text{gallons/day}$$

To complete the example, the flow through the sand filters for Boydton Landing would be equivalent to:

$$13,600 \text{ peak flow g.p.d.} \times 0.425 = 5780 \text{ gallons per day capacity}$$

A-17 SOLID WASTE DISPOSAL

The responsibility for solid waste disposal will be with the local managing agency for each development site. Refuse will be collected on a regularly scheduled basis. The refuse will be transported to approved landfill areas. The Vance and Mecklenburg County landfills are presently being used. During peak weekends, a landfill at the operations area near the dam is used as a temporary holding area until the County landfills open after the weekend.

Containers or trash cans will be located at each activity area. Centralized collection stations will be utilized wherever possible to reduce maintenance costs and to reduce the visual impact on recreation areas.

A-18 ELECTRIC AND TELEPHONE SERVICE

The reservoir area is served with power by the Virginia Electric and Power Company, the Carolina Power and Light Company, Mecklenburg Electric Cooperative and Piedmont Electric Cooperative distribution systems. Facilities at the damsite are served directly

from the power station service units. To the extent practicable, all electric and telephone service lines within the public use areas at John H. Kerr Reservoir will be placed underground. Underground lines will be located within road clearing limits and right-of-ways, or placed on a bench in trenches shared with other utilities so as to minimize site disturbance and costs. Transformers and distribution panels will be provided where necessary. Buildings, sewage lift stations, boat ramps, wellhouses, most parking lots and Class A camping units will be furnished with electric power.

Lighting will be provided at various facilities for the safety, security, and convenience of project visitors. Low level night lighting will be provided around camping areas, control stations and sanitary facilities. Security lighting to prevent vandalism and provide lighting for emergency work will be provided at administrative, maintenance, and operational structures at the project. Also for safety and convenience, lighting will be provided at boat ramps for night identification and night-time launchings. All lighting and electrical service will be designed in accordance with the criteria and standards contained in Appendix A of EM 1110-2-400. The cost of electricity to an area includes transformers, junction boxes, and trenching.

A-19 WATER SUPPLY SYSTEM

A. Water Supply. A source of potable water will be provided at each recreation site at the project where warranted by anticipated use. Whenever feasible, existing public water supply systems will be utilized to provide water to recreation areas. Areas that are not within a reasonable distance of an existing public water supply system will be provided with wells. Table 2-06 indicates anticipated yields for new wells based on geologic formations. All water supply systems will be designed in compliance with ER 1110-2-4201, "Design of Water Supply Systems", Appendix A of EM 1110-2-400, and state standards for public water supplies.

B. Siting. Facilities are located according to the following:

1. Wells and treatment facilities will be located near roads or parking areas so that service vehicles can reach them. They will also be located away from visitors use areas and screened by landscape plantings.

2. Water and sewage lines will be located so as to cause minimum site disturbance.

C. Water Quality Criteria. Water supply facilities will meet the standards and requirements set forth by the U. S. Public Health

Service, the states of Virginia and North Carolina and the U. S. Army Corps of Engineers.

D. Demand. Estimates of demand will be based on the criteria contained in EM 1110-2-400, similar projects, guidance from the South Atlantic Division, and "Table 1 - Planning Guide for Water Use," from the Manual of Individual Water Supply Systems produced by the Water Supply Division of the Environmental Protection Agency. Table A-04, Estimates and Wastewater Flows and Demand on Water Supply, summarizes the preceding data. Table A-04 and Tables 10-02 to 10-10 can be used to determine the water supply needs for recreation areas. For estimating purposes, sewage flows are 80 percent of water supply demand for recreation area use. Therefore, the quantity figure for sewage listed in Table 10-02 to 10-10 divided by 0.8 results in a figure which applies as the peak demand in gallons per day for water supply. The peak sewage flow for Boydton Landing was demonstrated in Section 16-E of this supplement. The peak demand on water supply is determined by taking that figure of 13,600 gallons of sewage per day, divided by 0.80, and results with a figure of 17,000 gallons per peak day water demand. Wells in the area must be capable of supplying water at this rate. Water storage tanks for the area must be sized to consider two peak days, 34,000 gallons for the example, to accommodate temporary well water shortages that may occur.

A-20 FACILITIES FOR THE ELDERLY AND HANDICAPPED

The design of all recreation facilities at the project will consider the special needs of elderly and handicapped visitors. Particular features that will be incorporated in the design of areas designated for handicap-use include:

1. Interpretive trails designed with appropriate slope, surfacing, and related design features to allow easy access and use for all visitors.
2. Building entrance ramps with non-slip surfaces for wheelchair access; water closets for use by the handicapped in each restroom.
3. Dock facilities that allow wheelchair access.
4. Special parking spaces to accommodate wheelchair unloading and that allow safe and convenient access to related facility areas.
5. Play equipment, picnic tables, and interpretive media that allow use by the handicapped.
6. Swimming areas to allow wheelchair access.
7. Campsites that area designed for handicap use.

TABLE A-04
ESTIMATES OF WASTEWATER FLOWS AND
DEMAND ON WATER SUPPLY*

TYPE OF AREA	GALLONS/DAY/PERSONS with waterborne facilities		GALLONS/DAY/PERSONS without waterborne facilities
	Water Supply	Sewage Flows	
Class A Camp	30	24	-
Class B Camp	25	20	-
Group Camp	10	8	5
Primitive Camp	5	4	2
Picnic Area	5	4	2
Boat Launching Area	5	4	2
Marina	10	8	-
Marine Dumping Station	30	24	-
Dwelling	75	60	-
Control Station	10	8	-
Swimming Beach and Bathhouse	10	8	-
Maintenance Area	50	40	-
Equestrian Area	10	8	-
Visitor Center	5	4	-
Fishing Area	10	8	2

*Source of Data: Table 3-05, U.S. Army, Corps of Engineers, Draft Engineering Manual, and EM 1110-2-400.

A-21 FISHING AREAS

Fishing areas will be provided on sites where high concentrations of fishing activity occur. These areas will provide 25 car parking spaces, paved trails to a fishing dock for accessibility by wheelchairs, a fish cleaning station, and a comfort station for use by fishermen.

EXHIBIT B
LIST OF AGENCIES AND GROUPS CONTACTED

B-01 FEDERAL AGENCIES

U.S. Department of Transportation
Federal Highway Administration
Post Office Box 26808
Raleigh, North Carolina 27611

U.S. Department of the Interior
Bureau of Outdoor Recreation
(now Heritage Conservation and Recreation Service)
Southeast Regional Office
148 Cain Street
Atlanta, Georgia 30303

U.S. Department of the Interior
Geological Survey
Water Resources Division
1459 Peachtree Street, N.E.
Atlanta, Georgia 30309

U.S. Department of the Interior
Geological Survey
P. O. Box 2857
Raleigh, North Carolina 27602

U.S. Department of Agriculture
Soil Conservation Service
Post Office Box 27307
Raleigh, North Carolina 27611

U.S. Environmental Protection Agency
Region IV
345 Courtland Street
Atlanta, Georgia 30308

Federal Power Commission
730 Peachtree Building
Atlanta, Georgia 30308

B-02 STATE OF NORTH CAROLINA

N. C. Department of Natural Resources & Community Development
Division of Parks and Recreation
P. O. Box 27687
Raleigh, North Carolina 27611

Wildlife Resources Commission
Raleigh, North Carolina 27611

N. C. Department of Human Resources
Division of Health Services
P. O. Box 2091
Raleigh, North Carolina 27602

N. C. Department of Cultural Resources
Division of Archives and History
Raleigh, North Carolina 27611

N. C. Department of Military and Veterans Affairs

N. C. Department of Agriculture

Kerr Lake State Recreation Areas

B-03 COMMONWEALTH OF VIRGINIA

Va. Department of Conservation and Economic Development
Division of State Parks
1201 State Office Building
Richmond, Virginia 23219

Division of Forestry
Box 3758
Charlottesville, Virginia 22903

Division of Forestry
Box 198
Waverly, Virginia 23890

Va. Commission of Outdoor Recreation
Eighth Street Office Building
803 East Broad Street
Richmond, Virginia 23210

Va. State Water Control Board
2111 Hamilton Street
Richmond, Virginia 23230

Va. Commission of Game and Inland Fisheries
Box 11104
Richmond, Virginia 23230

Va. Council on the Environment
903 Ninth Street Office Building
Richmond, Virginia 23219

Va. Department of Intergovernmental Affairs
Fourth Street Office Building
205 North Fourth Street
Richmond, Virginia 23230

Va. Department of Taxation
Richmond, Virginia 23282

B-04 LOCAL AGENCIES

North Carolina League of Municipalities
1010 Raleigh Building
Raleigh, North Carolina 27602

Kerr-Tar Regional Council of Governments
Post Office Box 1500
506 South Chestnut Street
Henderson, North Carolina 27536

Halifax County Chamber of Commerce
P. O. Box 355
South Boston, Virginia

Southside Planning District Commission
South Hill, Virginia

Vance County Board of Commissioners
Henderson, North Carolina

Granville County Board of Commissioners
Creedmoor, North Carolina

Warren County Board of Commissioners
Warrenton, North Carolina

Mecklenburg County Board of Supervisors
Buffalo Junction, Virginia

Halifax County Board of Supervisors
South Boston, Virginia

Charlotte County Board of Supervisors
Phenix, Virginia

Office of the Mayor
Town of Clarksville
Clarksville, Virginia

B-05 PRIVATE INTEREST GROUPS

North Carolina B.A.S.S. State Federation, Inc.
P. O. Box 514
Chapel Hill, North Carolina 27514

The Conservation Council of North Carolina
P. O. Box 2001
Raleigh, North Carolina 27602

Kerr-Buggs Island Lake Protective Association

Cuscowilla Subdivision

Merrifield Acres

EXHIBIT C
SUMMARY OF PROPOSALS FOR
CORPS OPERATED AREAS

The purpose of this exhibit is to summarize development activities proposed in the Master Plan Update for all recreation areas operated by the Corps of Engineers. It also indicates the prioritization of these activities for each area. The information presented in this exhibit is taken from three sections of the Master Plan Update, Section 7-05 (A); Section 7-09, Table 7-04A; and Section 7-10. Development actions presented below are listed in decreasing order of priority within each recreation area.

Palmer Point

1. Relocate boat launch and parking to the new area on site.
2. Rehabilitate the existing beach and picnic units.
3. Relocate 45 camp units allocated to this area to the new campgrounds at Ivy Hill.

Island Creek

1. Rehabilitate existing boat launch.
2. Develop new day use area with 25 new picnic units and nine picnic units relocated from near the boat launch.

Grassy Creek

1. Rehabilitate day use areas and boat launch.
2. Relocate five camp units to Ivy Hill.
3. Relocate six camp units to Longwood.
4. Redevelop old camping area to day use with 10 new picnic units.

Ivy Hill

1. Rehabilitate existing day use area and picnic shelter (including shoreline protection).
2. Rehabilitate existing campground.
3. Develop camping area B with 25 Class B units.
4. Develop camping area C with 25 Class B units.
5. Develop interpretive trail into the undeveloped portion of the site.

EXHIBIT C
SUMMARY OF PROPOSALS FOR
CORPS OPERATED AREAS

The purpose of this exhibit is to summarize development activities proposed in the Master Plan Update for all recreation areas operated by the Corps of Engineers. It also indicates the prioritization of these activities for each area. The information presented in this exhibit is taken from three sections of the Master Plan Update, Section 7-05 (A); Section 7-09, Table 7-04A; and Section 7-10. Development actions presented below are listed in decreasing order of priority within each recreation area.

Palmer Point

1. Relocate boat launch and parking to the new area on site.
2. Rehabilitate the existing beach and picnic units.
3. Relocate 45 camp units allocated to this area to the new campgrounds at Ivy Hill.

Island Creek

1. Rehabilitate existing boat launch.
2. Develop new day use area with 25 new picnic units and nine picnic units relocated from near the boat launch.

Grassy Creek

1. Rehabilitate day use areas and boat launch.
2. Relocate five camp units to Ivy Hill.
3. Relocate six camp units to Longwood.
4. Redevelop old camping area to day use with 10 new picnic units.

Ivy Hill

1. Rehabilitate existing day use area and picnic shelter (including shoreline protection).
2. Rehabilitate existing campground.
3. Develop camping area B with 25 Class B units.
4. Develop camping area C with 25 Class B units.
5. Develop interpretive trail into the undeveloped portion of the site.

Buffalo Springs Wayside

1. Rehabilitate the existing facilities.
2. Place a marker at the site to commemorate the historic interest of the area.
3. Plant ornamental trees to improve the area's visual quality.

Staunton View

1. Relocate seven picnic units to North Bend Park.
2. Relocate one picnic unit to Longwood, develop as a camp unit.
3. Rehabilitate existing campground.
4. Develop new Class A campground with 25 units.
5. Add boat launch without parking to the camping area.

Buffalo

1. Rehabilitate existing boat launch (including shoreline protection).
2. Rehabilitate existing day use area.
3. Relocate camp units to Longwood.
4. Develop new day use area at the former campground.

Tailrace Access Area

1. Upgrade the existing boat launch and add parking for cars and car/trailers.
2. Develop new day use area with ten picnic units and play equipment.

Bluestone Landing

1. Add new boat launch and additional parking.
2. Relocate picnic units to Clarksville Overlook.

Rudd's Creek

1. Rehabilitate boat launch and add additional parking.
2. Rehabilitate camping area A and relocate 15 camp units from camping area B to this area.
3. Relocate day use area to the former site of camp area B.
4. Add a boat launch without parking to the camping area.
5. Add new campground with 25 Class B units to the area adjacent to camping area A.

Eastland Creek Landing

1. Rehabilitate boat launch and existing day use area.
2. Relocate 25 camp units to the new Rudd's Creek development and three to Longwood.
3. Develop a group use picnic area with 25 units on the site of the former campground.

Eagle Point

1. Rehabilitate the existing boat launch area.

North Bend Park

1. Initiate rehabilitation program beginning with shoreline protection, day use facilities, then campgrounds.
2. Develop new Visitor's Center/Resource Manager's Office.
3. Encourage expansion of the marina facility.
4. Develop new day use area.

Clarksville Overlook

1. Develop boat launch and day use facilities.

Priorities of development between recreation areas are listed below. These priorities are based on the level of use at each area, the demand for facilities, and the objective of creating more manageable, self-sustaining facilities.

1. North Bend Park
2. Rudd's Creek
3. Longwood
4. Tailrace Access Area
5. Ivy Hill
6. Buffalo
7. Clarksville Overlook
8. Eastland Creek
9. Grassy Creek
10. Island Creek
11. Palmer Point
12. Bluestone Landing
13. Buffalo Springs Wayside
14. Staunton View
15. Eagle Point Landing

TEAM MEMBERS

BOOKER ASSOCIATES, INC.

Lexington, Kentucky

Courtney F. Porter	Principal In Charge
Robert B. Bax	Project Manager/Chief, Planning Section
Peter F. Jackson	Assistant Project Manager/ Environmental Planner
Douglas Counts	Landscape Architect
Patrick D. Hoagland	Landscape Architect
Lowell M. Britt	Urban and Regional Planner
James Crabtree	Recreational Planner
Jeffery L. Peterman	Civil Engineer
Greg Knauer	Biologist
Richard Pietruska	Forester
Kurt Larsen	Architect
Allen Mather	Graphics Specialist
James L. Taylor	Senior Technician
Jacqueline G. Bateman	Typist